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MONOGRAPH

OF THE

TRILOBITES OF NORTH AMERICA:

WITH

Models of the Species.

1855—

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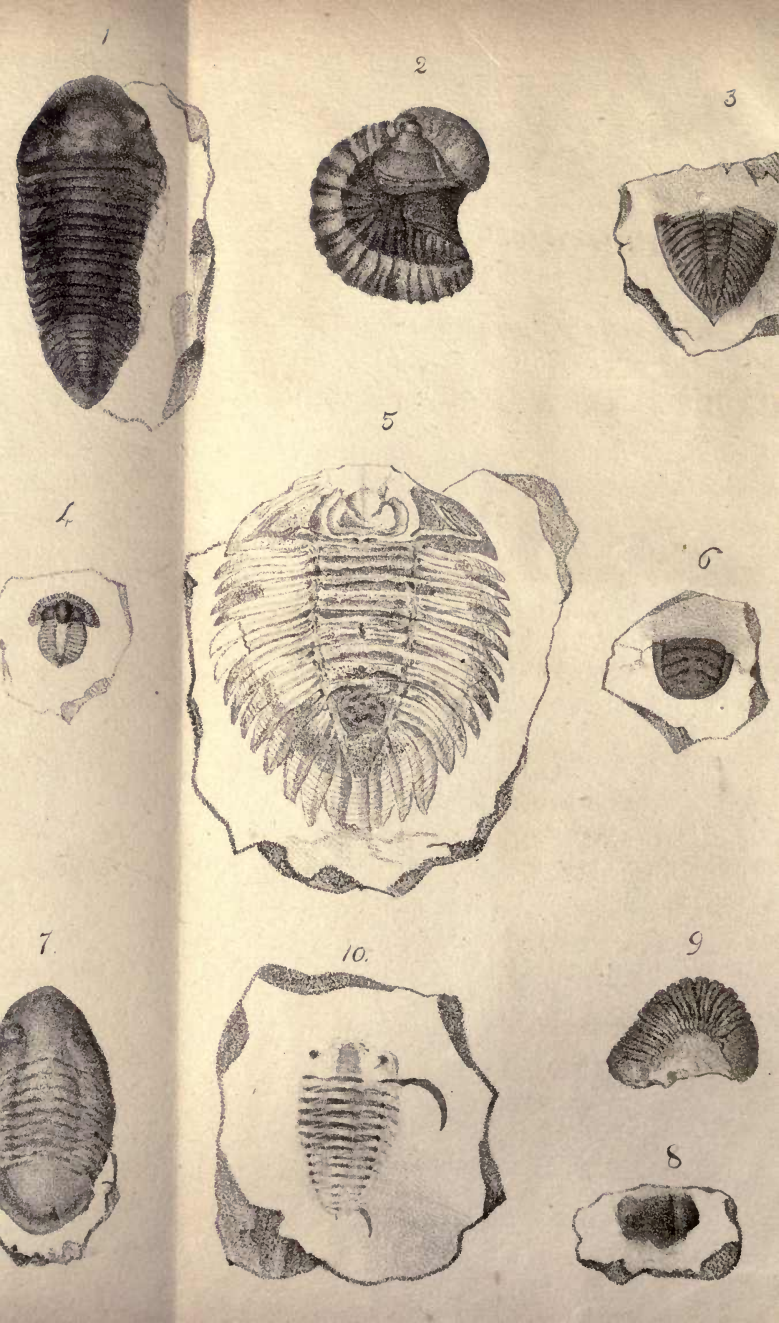
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A

MONOGRAPH

OF THE

TRILOBITES OF NORTH AMERICA:

WITH

Coloured Models of the Species.

Multa renascentur quæ jam cecidere.—Hor.

BY

JACOB GREEN, M. D.

Professor of Chemistry in Jefferson Medical College.

PHILADELPHIA:

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1832.

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To JOHN GEORGE CHILDREN, Esquire,
F. R. S. L. & E.

The kindness which a traveller receives when in a distant land, must ever be among his most pleasing recollections—your attentions therefore to me, during my short residence in London a few years since, cannot easily be forgotten. Suffer me, then, to inscribe this little work to you as a token of my gratitude.

Our pursuits in the Natural and Physical Sciences have been congenial. Your interesting researches with your original and magnificent Galvanic Battery, first drew my attention to the calorific effects of that mysterious agent; and your works on Natural History have stimulated my exertions in the same fascinating pursuit.

A large portion of your time and fortune have been devoted to the patronage or the cultivation of Natural Science—so that the dedication of this work to you, if it were infinitely more worthy of your acceptance, would be due from me, both as a tribute of high respect, as well as of grateful acknowledgment.

Philadelphia, October 1*st*, 1832.

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EXPLANATION OF THE PLATE.

Figure 1. Trimerus Delphinocephalus.
2. Calymene Diops.
3. Asaphus Micrurus.
4. Cryptolithus Tessellatus.
5. Paradoxides Boltoni.
6. Triarthrus Beckii.
7. Isotelus Cyclops.
8. Dipleura Dekayi.
9. Head of D. Dekayi.
10. Ceraurus Pleurexanthemus.

The above figures represented on the Frontispiece to this volume, were first published in the Monthly Journal of Geology, &c. for June, 1832, and I am indebted to C. A. Poulson, Esq., for the use of them in this Monograph.

INTRODUCTION.

Some geologists imagine that the order of creation is registered in the rocks which compose the external crust of the earth, and that they can there clearly read a progressive development of organic life; in other words, that a succession of more perfect animals may be traced in ascending from the lower strata to the upper or more recent formations; that there is a gradual approach to the present system of things, and a succession of destructions and creations; worlds of living beings alternating with worlds of desolation and death, antecedent to the existence of man.

Others, again, contend that there is often a wide and palpable discrepancy between the nature of the rock, and the fossils which it contains, and, therefore, that such inquiries afford no clue, whatever, to the order of creation.* We propose not to enter the field

* Nothing can be more opposed to true science, than to pronounce on the priority of formation, or the comparative age of rocks, from either their structure, or the organic remains they present. M. Alexandre Brongniart thus propounds his opinion: "In those cases where characters derived from the nature of the rocks are opposed to those which we derive from organic remains, I should give the preponderance to the latter." This seems to us to imply an admission, that nothing definite can be inferred from the *nature of the rocks;* moreover, that between

of controversy. Fossils are undoubtedly historic medallions of remote periods in the natural history of our earth, and our design is, merely to illustrate with them a neglected department of ancient zoology, by describing a few which have recently fallen under our own observation.

In some varieties of rocks there is often found the fossil remains of an animal which bears some resemblance to certain species of the crab. The back of this organic relic is commonly divided by two deep grooves or furrows, into three longitudinal lobes, and from this circumstance, the term *Trilobite* has been applied as a family name to distinguish this whole race of beings. This general appellation, however, though in most of the species, highly appropriate, is by no means applicable to all.

The individuals which compose the family of the trilobites resemble each other in many important par-

the nature of the rock, and the organic remains, there may be a palpable discrepancy; and that these may be even at complete antipodes with each other. The event has proved, from what we have already mentioned, that no evidence as to priority can be obtained from the nature of the fossil remains displayed in particular strata. In addition to what has been said on this subject, we may further state, that *encrinites*, *entrochites*, and *pentacrinites* are found in clay slate, grauwacke, transition limestone, alpine limestone, lias, muschelkalk, and chalk. It may be reasonably asked how these three species of fossils could indicate any particular formation, when they are found in so many types and structures of rocks altogether different? If they would go to prove any thing at all, it would be that of a *contemporaneous* formation; but certainly not distinct epochas.—*See Eclectic Review, July*, 1832.

ticulars, and form together an exceedingly natural group. The body, with but few exceptions, is divided transversely into three parts. The anterior portion or head often resembles the buckler of the *horse foot* or *king crab* (*limulus polyphemus*), so common on our sea coast. The middle portion is the *abdomen*, and is always separated transversely into a number of segments or articulations, generally diminishing in breadth as they recede from the head. The posterior end is the *tail*, which, though in some species, a mere prolongation of the abdomen, that can scarcely be distinguished from it, yet in others it assumes a genuine caudal appendage.

The head of the trilobite is also generally divided into three parts: the middle is called the *front*, or forehead; and the lateral portions the *cheeks*. In most cases, a projecting tubercle, or knob, is observable on the anterior surface of each cheek, which has much the appearance of an eye. Its reticulated structure is in many instances so analogous to that of the eyes of some crustaceous animals, and also of some species of insects, that there can be but little doubt that these tubercular projections, were true organs of vision.

Some of the genera which belong to this remarkable race of fossil animals, possessed the power of rolling or coiling themselves up into a kind of ball, like certain species of insects, or like the armadillo; and they are always found embedded in the rocks in this attitude.

Such are the general characters by which these

petrifactions may be known, and they will be found illustrated in a manner more or less striking, in most of the species. The exceptions, which rarely occur, will be distinctly marked, when the species are described.

The superior covering, or upper shell of the trilobite is the only part of the animal, concerning which we have any satisfactory knowledge. It is conjectured that it was furnished with articulated feet, but no traces of any organs of progressive motion have hitherto been fairly discovered.* Hence, it may be reasonably supposed, that the structure of the lower portions of the animal were so soft and delicate, as to render them incapable of sustaining the process of mineralization, which the hard crustaceous covering of the back so successfully undergoes.

That these petrifactions were once marine animals there can be little doubt, for they are always found associated in the same rocks with shells, and other productions peculiar to the sea.

The Trilobite is supposed by many naturalists to

* Mr. Parkinson states, that in a trilobite which he possessed he thought he perceived the *points* of the feet; but on endeavouring to detach the piece of rock in which it was embedded, the specimen was entirely shivered, though he worked at it with the utmost care. A portion of the underside of a trilobite (*Isotelus gigas*) near the anterior edge of the head, was distinctly ascertained, by Dr. Dekay, but only enough to convince him of its analogy in this part with that of the limulus polyphemus—no organs of locomotion could be seen. Mr. Stokes, the distinguished fossilist of London, has confirmed the observation of Dr. Dekay, by some dissections of his own.

be one of the first animated beings of our earth called into existence by the great Author of nature.* It was first noticed more than two centuries ago, among the petrifactions which abound in a calcareous rock, at Dudley, in England, and was from this circumstance, called for a long time, the *Dudley fossil.* Linné gave it the name of the *Paradoxical insect;* but whether an insect, a crustaceous animal, or a shell, is still considered by many as problematical.

Notwithstanding the high antiquity of the family of the Trilobites, and the remarkable characters the different individuals which compose it, sustain in the animal kingdom; till within a very few years, the whole race has been almost entirely neglected by naturalists. The first attempt at any systematic arrangement of the genera and species, was made in 1815, by Alexander Brongniart, Professor of Mineralogy, &c. &c., in Paris.† Until that period, the term

* It is obvious, that if most of the gelatinous animals which now inhabit our seas, were to become extinct, few or no traces of them could be found in any succeeding depositions of earthy matter. Whatever kind of animal life, therefore, may have been the first which appeared in our planet, must be entirely hypothetical. All that we can with certainty say of it, is, that it was best adapted to the circumstances, in which it was to exist, and that it was consistent with the wisdom and design which we see every where pervading the universe.

† I cannot let this opportunity pass, without acknowledging my obligations to Professor Brongniart, for his civilities, when on a late visit to Paris. Every one whose curiosity leads him to examine the royal manufactory of porcelain, a Sevres, of

Entomolithus Paradoxus, proposed by Linné, was applied to all the fossil remains, which in their general appearance bore any resemblance to that found at Dudley, and which he first described under that name. The confusion, therefore, which existed in this department of natural science, may readily be imagined; especially, as the species rapidly multiplied, when they were supposed to throw some rays of light on certain obscure geological phenomena. Soon after the appearance of Professor Brongniart's excellent work, the attention of other naturalists was directed to this neglected part of creation. The most important memoir, on account of the number of species, well figured and described in it, is one by Dr. E. W. Dalmann, published in the Transactions of the Swedish Academy, for 1826. There is also in the Acts of the Royal Society, at Upsal, an excellent paper on this subject by Professor Wahlenberg. Our highly esteemed friend, Dr. James E. Dekay, has also given in the first volume of the Annals of the Lyceum of Natural History of New York, some very interesting and ingenious observations on the nature and the structure of the Trilobites, with a description of a new genus. These are the principal authorities which have been consulted in arranging the present work.

Our object in the present undertaking being merely to give a monograph of the species of Trilobites

which he is the director, will no doubt acknowledge that his talents as a philosopher, are rivalled by his accomplishments as a gentleman.

found in the rocks of North America; we leave to other and abler hands the more difficult and interesting task of determining with precision the connexion which may exist between these organic reliques, and the relative ages of the strata in which they are found.

It is supposed, indeed, that a sufficient number of well characterized species have not yet been collected and accurately described, to throw any certain and clear light on otherwise doubtful geological phenomena. What has been remarked by De Candolle, with regard to botanical geography, is perhaps true of these fossils as to solving the difficult problems of geology—"Let us not forget," says he, "that this science can only be commenced when the study of *species* has been sufficiently advanced to furnish us with numerous and well authenticated facts."

We are well aware of the difficulty of settling the line which ought to divide species. Individuals perfectly identical in all their parts, are rarely, if ever seen; though a general resemblance may be easily traced. Among fossils, just discriminations of this kind are more delicate, than in recent specimens. The hand of time, accidental causes, and the influence of atmospheric changes often produce such characters as to render the determination of fossil species an exceedingly difficult task. We have no doubt, therefore, that a few of our Trilobites, which are now considered as perfectly identical with some found in Europe, will upon fuller examination, be discovered to be dissimilar, and of course certain

geological speculations grounded on the first opinion, be ultimately abandoned.

The geographical distribution of organic remains, is an exceedingly curious inquiry. If accurately pursued, without reference to any preconceived theory, it will no doubt furnish much information as to the comparative ages of the different strata which compose the external crust of our planet—for that these strata were deposited or formed at periods of time more or less remote from each other, every one knows, to be a generally admitted *geological fact*. The occurrence of similar fossils in districts of country remotely situated from each other, certainly presents a phenomenon highly interesting to the speculative naturalist, and apparently indicates that the same powerful and general causes must have concurred to produce these isomorphous depositions. No fossils have contributed more to this kind of information, than those of shells, and as the mineralized species could not be satisfactorily studied, except by accurately comparing them with those which now inhabit our seas and continents; the search for shells, has become, from a simple amusement, the study of scientific men—or, as a writer remarks, "it was only after the period when it was perceived that geology and ancient zoology were destined to be enlightened by their fossil remains, that this research passed from the hands of amateurs into those of naturalists."*

* We have not unfrequently noticed, both in the writings and conversation of some geologists, a disposition to sneer at the subsidiary branches of natural history. Mineralogy and con-

Another curious *geological fact* appears to be established more especially by fossil trilobites; it is that precisely the same species of animal relic, is the most generally diffused over the globe, in proportion to the antiquity of the rock which contains it. Thus the transition limestone of England, France, Germany and Sweden, contains the species called the Calymene of Blumenbach, in common with the same formation which extends over so large a portion of the United States.

Different genera and species of the trilobite are now found in almost every part of the globe, and are frequently exceedingly abundant in the rocks which contain them. That they must have swarmed in particular places, is abundantly evident from a number of localities in our own country,—millions, for example, must have lived and died not far from Trenton falls, in the State of New York. There are very few of the numerous visiters to that romantic cascade, whose curiosity is not awaked, by the multitude of these petrified beings, seemingly of another world, which are there entombed.

chology, are light and mean in their estimation, when compared with the study of extensive strata and ponderous boulders. Like Irving's testy governor of Manahatta, who settled the accounts of his clients by placing their books in the opposite scales of a balance, they decide on the value of a science, by the absolute weight of the objects embraced by it. Geology, as well as any other branch of natural history, may degenerate into a mere love for the curious, or have for its principal aim, the perfection or improvement of some ideal system of classification, without advancing a single step further.

Although many parts of the trilobite are now found distributed through the rocks which contain them, in such a manner as to lead to the conclusion, that they were separated by decomposition, after the death of the animal; yet the perfect preservation of others, and the rolled and disjointed attitudes which we should expect such creatures to assume when disturbed, lead to the conjecture, that they have been often suddenly destroyed, and as suddenly enveloped in that earthy matter, which afterwards became an indurated rock; thus preventing the separation of the harder parts, by the slow process of decomposition.*

The fossil remains of the trilobite family, are supposed by most naturalists to belong to a race of beings now extinct; but from the strong analogy which exists between them and certain species of crustaceous animals now living, it is highly probable that they will yet be found alive. This opinion will not be regarded as visionary, when it is recollected how large a portion of the surface of the earth is still unexplored by its enlightened and civilized inhabitants —how small the number of animated beings are yet known to the scientific world—and above all the fact, that many animals as confidently declared to be peculiar to a former world, are now found to be among the creatures at present in existence. This opinion, we think, is quite as plausible, and far more interesting, than the blank and unsatisfactory hypothesis that

* Vide De la Beche's Geological Manual.

all the trilobites are confined to an order of things before the present glorious creation.*

There appears to have been known to naturalists, when the improved edition of Prof. Brongniart's work on the trilobites appeared in 1822, but 17 well marked species, and out of which he constructed the five following genera, which he thus characterizes.

Genus First. CALYMENE.

Body capable of contraction into nearly a semi-cylindrical sphere.

Buckler with many tubercles or folds. Two reticulated eye-shaped tubercles.

Abdomen and Post-abdomen with entire edges. Abdomen divided by 12 or 14 articulations.

No elongated tail.

* The incorrectness of the inference that all the genera and species of fossil animals found in the transition rocks must be now extinct, will appear from the following extract from Bakewell's Geology:—"The *Madrepora stylina*, so common in transition lime-stone rock, is entirely wanting in the secondary and tertiary strata, but a living animal of this species has been recently discovered in the South Seas. The Pentacrinus makes its first distinct appearance in the lias; but is not frequently met with in the upper strata, and disappears entirely in the uppermost formations: hence it was long supposed that the species was extinct. A living Pentacrinus has recently been discovered in the West Indies, and its stem and branches in a perfect state have been sent to this country." (England.) In the Museum at Albany, N. Y., I have examined a recent Pentacrinus, which I conclude, came from the West Indies, from the proprietor's account of the manner in which he obtained it. It has been a very perfect specimen—but the branches are gradually dropping off."

Genus Second. Asaphus.

Body broad and rather flat. Middle lobe prominent and very distinct.

Flanks or lateral lobes each double the size of the middle lobe.

Submembranaceous expansions extending beyond the lateral lobes.

Buckler semicircular, with two reticulated eye-shaped tubercles.

Abdomen divided into 8 or 12 articulations.

Genus Third. Ogygia.

Body much depressed into an oblong ellipsis—not contractile into a sphere.

Buckler edged, a slight longitudinal furrow arising from its anterior extremity. Posterior angles elongated into points.

Without any tubercles except the eyes, which are neither prominent nor reticulated.

Longitudinal lobes slightly prominent.

Abdomen with 8 articulations.

Genus Fourth. Paradoxides.

Body depressed—not contractile.

Flanks much broader than the middle lobe.

Buckler nearly semicircular—three transverse furrows on the middle lobe.

Eye-shaped tubercles none.

Abdomen with 12 articulations.

Arches of the lateral lobes, more or less prolonged beyond the membrane which sustains them.

Genus Fifth. AGNOSTUS.

Body ellipsoidal—semicylindrical.

Buckler and flanks edged—the edges being slightly elevated.

Middle lobe with two transverse divisions, each composed of a single piece.

Two glandular tubercles on the anterior part of the body.

In 1824, Dr. J. E. Dekay added a sixth genus to the family of the trilobites, which he describes in the following manner.

Genus Sixth. ISOTELUS.

Body oval oblong, often contracted, not unfrequently extended.

Head or *buckler* large and rounded, equalling the tail in size, with but two oculiform tubercles.

Abdomen with 8 articulations.

Frontal process beneath, with two semilunar terminations.

Post-abdomen or *tail* broad, expanded with indistinct divisions, as large as the buckler.

Longitudinal lobes very distinct.

This genus, he remarks, will be sufficiently distinguished from the five genera proposed by *M. Alexandre Brongniart* in his valuable and truly philosophical work on the trilobites by the following particulars.

From *Calymene.* By the presence of but two tu-

bercles on the buckler not reticulated; by the abdomen with but 8 articulations.

From *Asaphus*. By the middle lobe, which is double the size of the lateral ones; by the absence of a membranaceous expansion on the sides; by the non-reticulation of the eyes, &c.

From *Ogygia*. By the rolled form, the rounded posterior angles of the buckler, and the distinct articulation of the longitudinal lobes.

From *Paradoxide* and *Agnoste* by characters too obvious to be enumerated. (See Annals of N. York Lyceum, &c. Vol. I. pp. 174–5.)

In 1826, J. W. Dalman published in the Transactions of the Swedish Academy, and also in a separate work, an account of the trilobites found in the North of Europe, in which he has enriched the family by a number of fine species, and with the following genera, which he modestly proposes merely as subdivisions.

Genus Seventh. NILEUS.

Body short, capable of contraction into a sphere, smooth, convex.

Abdomen with about 8 articulations, without any dorsal longitudinal furrows.

Buckler sub-lunate, with large lateral eyes.

Tail expanded, not so large as the buckler, without lobes.

Genus Eighth. ILLÆNUS.

Body ovate oblong, contractile.

Head rounded in front, eyes small, in the temples, very remote.

Abdomen with from 9 to 10 articulations, trilobate.

Tail expanded as large as the head.*

Genus Ninth. AMPYX.

Body very short, contractile.

Buckler large, triangular, gibbous; eyes not remarkable.

Abdomen short, articulations few (6?), trilobate.

Tail expanded, not so large as the head.

Professor Dalman has two other genera, which he calls Olenus and Battus, the first is the Paradoxides, and the second the Agnostus of Brongniart.

In the 8th Volume of Annales des Sciences Naturelles there is a highly valuable paper "Sur les Trilobites et leurs gisemens," by the Count Rasoumowsky, in which he describes some new trilobites from Russia; the one which he has figured and described as a Calymene† from Tzarsko-Selo, undoubtedly belongs to a new genus, very near to the Isotelus. The middle lobe is visible or naked through its whole extent, and the lateral lobes near the tail are covered with a thick cuticular membrane. This genus we propose to call Hemicrupturus, and may be thus characterized.

* Some of the species described by Professor Dalman as included in this genus, we think ought to be referred to that of the Isotelus.

† The editors of the Annales remark that this is not a Calymene, but that it appears to belong to the genus Asaphus.

Genus Tenth. HEMICRUPTURUS.*—*Green.*

Body contractile.

Buckler oculiferous and not lobate.

Abdomen trilobate, with 8 articulations.

Tail, costal arches covered, middle lobe naked.

The asaphus expansus of Dalman, and several other known species may be arranged under this genus.

As Count Rasoumowsky has given no specific appellation to the fossil above alluded to, we propose to call it after his own name, *Hemicrupturus Rasoumowskii.* We examined the fine specimen from which our cast is taken in the cabinet of the Baltimore College, and for this favour we are indebted to the kindness of Dr. J. J. Cohen, one of the Professors in that rising institution.

The following list includes *all* the genera and species of the Trilobite Family, hitherto described as far as known to the author. It is taken from De La Beche's Manual of Geology.

NAMES.	AUTHORS.	LOCALITIES.
Calymene Blumenbachii,	Al. Brong.	Europe—U. States.
Macrophthalma,	do.	Europe—U. States.
Variolaris,	do.	Europe.
Tristani,	do.	Europe—U. States.
Bellatula,	Dalman.	Europe.
Ornata,	do.	Europe.
Verrucosa,	do.	Europe.

* From three Greek words which signify *half-concealed tail.*

NAMES.		AUTHORS.	LOCALITIES.
Calymene	Polytoma,	Dalman.	Europe.
	Artinura,	do.	Europe.
	Sclerops,	do.	Europe.
	Schlotheimi,	Brown.	Europe.
	Latiferus,	do.	Europe.
Asaphus	Cornigerus,	Al. Brong.	Europe.
	Caudatus,	do.	Europe—U. States.
	Hausmanni,	do.	Europe—U. States.
	De Buchii,	do.	Europe.
	Brongniartii,	Deslongchamps.	Europe.
	Extenuatus,	Wahlenberg.	Europe.
	Granulatus,	do.	Europe.
	Expansus,	do.	Europe.
	Crassicauda,	do.	Europe.
	Angustifrons,	do.	Europe.
	Heros,	Dalman,	Europe.
	Platynotus,	do.	Europe.
	Frontalis,	do.	Europe.
	Læviceps,	do.	Europe.
	Palpebrosus,	do.	Europe.
	Sluzeri,		Europe.
Ogygia	Guettardii,	Al. Brong.	Europe.
	Desmaresti,	do.	Europe.
	Wahlenbergii,	do.	Europe.
	Sillimani,	do.	Europe—U. States.
Paradoxides	Tessini,	do.	Europe.
	Spinulosus,	do.	Europe.
	Gibbosus,	do.	Europe.
	Scaraboides,	do.	Europe.
	Hoffii,	Goldfuss.	Europe.
Nileus	Armadillo,	Dalman.	Europe.
	Glomerinus,	do.	Europe.

NAMES.		AUTHORS.	LOCALITIES.
Illænus	Centaurus,	Dalman.	Europe.
	Centrotus,	do.	Europe.
	Laticauda	Wahlenberg.	Europe—U. States.
Ampyx	Nasutus,	Dalman.	Europe.
Olenus	Bucephalus,	Wahlenberg.	Europe.
Agnostus	Pisciformis,	Al. Brong.	Europe.
Isotelus	Gigas,	De Kay.	United States.
	Planus,	do.	United States.

Genera and Species not fully determined.

Trilobites	Cephaleurya,	Rafinesque,	United States.
	Simia,	do.	United States.
	Granulata,	do.	United States.
Bilobites	Lunulata,	do.	United States.
	Lobata,	do.	United States.

From the short descriptions given by Professor Rafinesque of the five last mentioned fossils, I conclude that they belong to the genus Calymene of Brongniart.

The study of the trilobites naturally leads to the consideration of those beings which appear to have inhabited our earth previous to the creation of man. Every one knows that the sceptical naturalist has drawn from these vestiges of organic life, an argument contradictory to the Mosaic account of the history of the world, and though every cavil of the least importance, urged against the truth of the sacred historian, has been triumphantly confuted, still, the geological sciolist boldly impugns his veracity, whenever any new facts in his science can be distorted to

his purpose. Such being the case, we cannot conclude this preface without briefly stating two or three methods by which any seeming discrepancies may be explained. First, those who imagine that the six periods of creation, mentioned in the beginning of the pentateuch, mean literally days of 24 hours each, believe that, as only a small part of the earth was at first required for the abode of man and the higher animals, the present continents might have remained as long beneath the waters, and have undergone every change necessary to solve this geological puzzle.

Again, others have thought that Moses, after recording, in the first sentence of Genesis, the great truth that all things were made by the will of an intelligent Creator—passed silently over some intermediate state of the earth, which had no direct relation to the history, or to the duties of man—and proceeded to describe the successive appearance of the present order of things. On this supposition, the fossil remains and peculiarities in the structure of the earth may have belonged to that intermediate state.

A third method of explaining the difficulty, and which we think highly satisfactory, is, by understanding the days of creation to mean, not ordinary days, but *periods of time*, in which the recorded events took place in the order described so briefly by the sacred historian. It is acknowledged by every one competent to judge, that among the Hebrews, *days* and *weeks* were often used in this manner. The accordance between the order in which, according to

the account of Moses, the work of creation was accomplished, and the order in which the fossil remains of plants and animals are deposited in the earth, has surprised, and has been acknowledged by learned sceptics themselves.*

It will be useless to push these arguments further. The catastrophes which have produced the secondary strata, and the diluvian depositions, could not have been local or partial phenomena; but rather than call upon a comet, with the abstracted philosopher, to deluge the earth for every new geological epoch—or to change the axis of motion of our planet —or to resort to any of his wild, fanciful, and impious theories, we should, with Sir Humphrey Davy, even prefer the dream that all the secondary strata were *created*, filled with the remains, as it were, of animal life, to confound the speculations of our geological reasoners.

* The Baron Cuvier, on this subject, remarks, respecting the Jewish legislator—"His books show us, that he had very perfect ideas respecting several of the highest questions of natural philosophy. His cosmogony, especially, considered purely in a scientific point of view, is extremely remarkable, inasmuch as the order which it assigns to the different epochs of creation, is precisely the same as that which has been deduced from geological considerations."

ACKNOWLEDGMENTS.

Every author who attempts a Monograph of any of the departments of Natural History, must necessarily depend, in a greater or less degree, upon the kindness and liberality of others. Rare and unique specimens, particularly of fossil species, are often scattered through different cabinets, and his work would be rendered very imperfect, if they were not intrusted to his care. In preparing the following Monograph on the plan of giving exact models of the species, instead of illustrating them by engravings in the usual manner, the specimens when used by the artist are perhaps more liable to accident, and it was at first supposed that this circumstance might have prevented the original design. But in no instance, where an application has been made, either to a public institution or to a private cabinet, has the author met with a refusal; indeed the courtesy, kindness, and liberality which he has experienced from naturalists, who have every where aided him in the prosecution of his work, form no inconsiderable portion of the gratification which he has received. Besides the acknowledgments to public museums, and to individuals, which are made in the body of the work, the author is desirous of recording in this place, the following cabinets from which he has derived much assistance.

IN PHILADELPHIA.

The Cabinet of John P. Wetherill.

The Cabinet of the Academy of Natural Sciences.

The Philadelphia Museum.—(Peale's.)
The Cabinet of P. A. Browne, Esq.
The Cabinet of Dr. R. Harlan.
The Cabinet of William Hyde.
The Cabinet of J. Pierce.
The Cabinet of the Geological Society.

Lambdin's Museum, Pittsburgh, Pa.
The Cabinet of D. Keim, Reading, Pa.

IN NEW YORK.

The Cabinet of the Lyceum of Natural History.
The Cabinet of Dr. J. E. Dekay.
The New York Museum.—(Peale's.)

IN ALBANY.

The Cabinet of the Albany Institute.
The Cabinet of Professor T. R. Beck.
Albany Museum.
The Cabinet of Dr. James Eights.

The Cabinet of the Rensselaer School.

IN BALTIMORE.

The Cabinet of Dr. Joshua J. Cohen.
The Cabinet of the Baltimore College.
The Cabinet of the Atheneum.
The Baltimore Museum.

The Cabinet of Professor Hall, Mount Hope.

TRILOBITES, &c.

Genus Calymene. *Brongniart.*

The name of this genus is derived from a Greek word which signifies *obscure* or *concealed.* The fossil animals included by it are characterized as having contractile bodies; the buckler as bearing many tubercles or folds—the cheeks as being oculiferous, and the abdomen and tail as being composed of from twelve to fourteen articulations or joints, without any membranaceous expansion. The Calymenes in thickness are nearly semicylindrical, and the buckler in front presents a *chaperon* or upper lip more or less raised. In perfect specimens, there is a small furrow which seems to indicate a separation between the upper and under parts of this kind of lip. The eyes are always raised, and frequently present the remarkable structure observable in many of the *crustacea;* but as this part is generally very prominent, the *reticulations* of the eye are commonly worn off or injured.

Professor Brongniart places but little confidence in any of the generic characters above enumerated, except the number of articulations of the abdomen:

these, however, in our opinion, are more vague and uncertain than most of the others. The genus, however, we think may be readily identified, after becoming familiar with one well characterized species. The general aspect of the buckler is peculiar—the body is not so depressed as in most other genera, and the lateral lobes are destitute of all membranaceous expansion.

To the genus Calymene, belongs the celebrated Dudley fossil, called *Entomolithus paradoxus* by Blumenbach, but which is not the same organic relic, to which Linné applied that name.

This genus includes a great number of species, and though some of them are said to be found in different and distant parts of the globe, they are according to our limited observation, for the most part confined, like recent species of animals, to particular districts. The C. polytoma, C. pulchella, C. bellatula, C. concinna, C. sclerops, and the C. punctata, all finely figured by Professor Dalman, and which are found in Sweden, have not yet been noticed in any part of North America.*

CALYMENE BLUMENBACHII. *Brongniart.* Cast No. 1.

Clypeo rotundato, tuberculis sex distinctis in fronte; oculis in genis emintissimis; corpore tuberculato.

* See the valuable and extensive communication of J. W. Dalman, M. D., on the Trilobites, in the Transactions of the Swedish Academy for 1826, part 2d.

In this species the upper lip presents a furrow parallel to its edges. The lip is straight. The cheeks are a little projecting. There are six rounded tubercles on the front, and fourteen articulations on the back; the tail is small, and the shell is covered with small rounded tubercles of unequal sizes.

The above is Professor Brongniart's description of this trilobite, which is the famous Dudley fossil described and figured by Littleton, in the Philosophical Transactions, (London) in 1750. According to Dalman, several distinct European species have been published under this name. The true C. Blumenbachii, he says, has thirteen articulations to the abdomen, and about eight to the tail. In the cabinet of G. W. Featherstonhaugh, Esq., we have examined a fine perfect specimen from Dudley,* in which there is fourteen abdominal joints. There can be no doubt, however, that several species have been confounded under the name of C. Blumenbachii; Dalman's C. Tuberculata and C. Pulchella are, we think, distinct from it, though he has marked them only as varieties.

The true C. Blumenbachii, no doubt, abounds in North America, and is one of the few examples of the occurrence of an identical species on both continents. The late Abbe Correa sent a perfect specimen to Brongniart, from the vicinity of Lebanon, in the state

* This famous trilobite, once formed a part of the cabinet of Mr. Parkinson, the distinguished author of the "Organic Remains," and is accurately figured on one of the plates of that splendid work. At the sale of the late Mr. Parkinson's fossils, it was purchased by Mr. Featherstonhaugh.

of Ohio. We have also seen a number of specimens from that state, which could not be distinguished from the Dudley trilobite. Our model was taken from a specimen found at Trenton Falls, in the state of New York.

The three following species found in the United States, will no doubt be considered by many as mere varieties of the C. Blumenbachii; we have ventured, however, to call them by distinct names.

CALYMENE CALLICEPHALA.* *Green.* Cast No. 2.

Clypeo antice attenuato, figura liliiformi in fronte depicta; oculis minimis; abdomine quatuordecim articulis; corpore plano.

The buckler is subtriangular; on the front there is a figure in high relief, somewhat resembling a *fleur de lis*, or perhaps more, the capital of a Corinthian column. The oculiferous tubercles are rather lower down on the cheeks than usual. The articulations of the abdomen and the tail cannot well be distinguished from each other; fourteen in all may be easily counted. The middle lobe of the abdomen is nearly equal in breadth throughout. The ribs, or costal arches, are not grooved or bifurcated at their extremities. Length nearly two inches and a half.

This beautiful species is in the Philadelphia Museum, where it is labelled as being found in "Hampshire, Virginia." It is mineralized by a dark yellow-

* From two Greek words, which signify "beautiful head."

ish limestone. It differs from the C. Blumenbachii, in the form and number of its articulations; in the shape of the head; in having only two flat tuberculous elevations on the front; and in other particulars.

In the cabinet of the New York Lyceum, and in that of J. P. Wetherill, Esq. there are some examples of this species from the Miami river, near Cincinnati, Ohio. I have also seen it from Indiana, in a dark coloured limestone, very much distorted. It has never been found at Trenton falls, or at any other locality, as far as my knowledge extends, which yields the true C. Blumenbachii.

CALYMENE SELENECEPHALA.* *Green.* Cast No. 3.

Clypeo antice rotundato, margine omni valde incrassato; prominentia frontali utrinque trituberosa; corpore tuberculato.

The buckler is regularly lunate; the margin is slightly reflected or raised anteriorly, the posterior edge forms a continuous rim, running nearly parallel with the articulations of the abdomen. The front on each side has one large and two small tubercles, near its superior edge. The oculiferous tubercles on the cheeks are on a line with the lowest frontal tubercle. There are fourteen distinct articulations; but as the tail is mutilated and distorted, the total number of joints cannot, from this specimen, be ascertained. The body appears to have been covered with small

* From the Greek for "lunate head."

pustules. These are very evident on the front. Costal arches simple, or not grooved. Length, one inch and three-fourths, breadth of the buckler one inch and one-fourth.

This species resembles a little the C. Pulchella of Dalman. The specimen from which the model was taken, is in the possession of Mr. R. Peale, of New York, who willingly lent it for this monograph. He informed me that it was found in the state of New York, but he was unable to name its precise locality. It occurs in a soft ash coloured limestone. No other petrifaction is observable in the fragment of rock which contains it.

CALYMENE PLATYS.* *Green.* Casts No. 4 and 5.

Clypeo antice rotundato; prominentia frontali utrinque quatuor tuberculis.

The buckler is probably semilunate; but as the anterior portion is lost, this cannot be determined with precision. The posterior raised rim is not continuous, as in the C. Selenecephala, but is separated by the longitudinal dorsal furrows. The front is distinctly divided from the cheeks, and has four tubercular prominences on each side. Three of them are nearly on a line with the lateral edge of the cheeks, and gradually diminish in size, as they descend to the anterior part of the buckler. The other is smaller, and is between, and a little to the side, of the upper

* From a Greek work which signifies Flat.

two. The cheeks form spherical triangles. The oculiferous prominences are close to the second large tubercle on the front. The cheeks are, however, quite imperfect. The articulations of the back cannot be distinguished from those of the tail. In our specimen they are all beautifully distinct, and are twenty-two in number. The posterior raised rim of the buckler seems to form an articulation; its extremities on each side are a good deal thickened and expanded. The costal arches suddenly curve downwards and backwards, near their middle, so as to divide the abdomen and tail into five unequal sections. The whole length is nearly three inches. The breadth of the buckler nearly two inches.

This fine large Calymene was accidentally discovered on the Helderberg mountain, by my friend, Professor T. R. Beck. One of the loose pieces of sandstone rolling over, near his feet, presented him the fine natural mould, from which he has kindly permitted our cast to be taken. The animal relic once enclosed in this matrix, must still be near that locality, and yet remains undiscovered, to reward the enterprise of some more fortunate naturalist.

One of our models represents the natural mould found by Dr. Beck. The other is a cast taken from it and exhibits, more satisfactorily, the various parts of the animal.

CALYMENE MICROPS.* *Green.* Cast No. 6.

Clypeo antice subattenuato; occulis minimis in lateribus capitis; abdominis articulis a 14 ad 18; corpore depresso.

The buckler is semielliptical, slightly punctate, and much depressed anteriorly; the front and cheeks are not very distinctly marked. The eyes are very remote from each other, being situated near the posterior lateral angles of the head. They are not very prominent, and exhibit no marks of being reticulated. Before the eye on each side, there is a slight transverse indentation. It is difficult to distinguish the articulations of the abdomen from those of the tail. They are from fourteen to eighteen in number. Where the lateral lobes remain perfect, two narrow raised lines appear between each of the ribs; these are most evident on the caudal extremities of the animal. The middle lobe is in the form of a long, slender, and acute cone. The whole animal is an inch and a quarter long, and is much more depressed than any other Calymene which we have seen.

I am indebted to Mr. Titian R. Peale for the use of the original from which our model was taken; his liberality to those who cultivate Natural History is proverbial, and needs no encomium from me. The C. Microps is said to have been found near Ripley, Ohio. It occurs in black limestone.

The eyes of this Calymene are small in compari-

* From the Greek for "small eyes."

son with those of some other species—particularly the C. Bufo, C. Macrophthalma, and C. Anthiops.

CALYMENE ANCHIOPS.* *Green.* Cast No. 7.

Clypeo antice, caudaque postice rotundatis; oculis approximis, magnis, excertis; articulis vigenti; corpore plano.

The buckler of this species is irregularly hemispherical; the front pyriform and without pustulations. The cheeks are almost entirely occupied by the eyes, which are placed very near each other on the upper part of the forehead; are very large and trilobate, the side lobes being elongated and attenuated in front. The articulations of the back are twenty in number, those of the abdomen not being distinguishable from those of the tail. The costal arches of the side lobes are round near their extremities, and are intersected with two or three raised lines. Length nearly four inches. Breadth about two inches.

It gives me great satisfaction in being able to describe, and to present to naturalists a good cast of this Calymene, which has excited for a long time so much interest and perplexity. The original fossil from which our plaster model was made is now deposited in the cabinet of the Albany Institute, and is the identical specimen from which a cast was long since made, by Dr. Hosack of New York, a specimen

* From two Greek words which signify "eyes approximate."

of which he sent in July, 1819, to the Royal Academy of Science, in France. Professor Brongniart referred the animal from which this model was taken, though with much hesitation and doubt, to the species, Calymene Macrophthalma. He remarks concerning it, "Il est beaucoup plus gros que les autres individus, et a près de neuf centimètres de longueur. C'est avec doute que je rapporte cette empreinte tres-peu nette à l'espèce actuelle; mais malgré ses formes obtuses, et l'absence de tout detail, elle est si remarquable par la grosseur de ces yeux et par le prolongement de son bouclier qu'on peut présumer qu'elle appartient au calyméne macrophthalme, et avec d'autànt plus de probabilité qu'elle vient aussi des Etats Unis d'Amérique. Elle a été trouvée, suivant M. Hosack, dans un schiste." We have seen the cast alluded to in the above note, and are not at all surprised at the uncertainty which it has occasioned. The apparent prolongation of the buckler is entirely occasioned by the loss of a small fragment from that portion of the head. The form and position of the eyes, further distinguish it from any of the numerous specimens of C. Macrophthalma, that we have examined. The raised lines which we have noticed as intersecting the costal arches of the lateral lobes are remarkable, though they may have been produced by accidental fissures in the epidermal covering of the animal. The head of the C. Macrophthalma is always marked by minute and prominent granulations, like *shagreen*—nothing of this kind appears on the buckler of the C. Anchiops.

I am informed by my friend, Dr. T. R. Beck, to whose liberality I owe this interesting species, that it was found in Ulster county, New York. It was supposed by Dr. Hosack, to have been discovered in the vicinity of Albany. Respecting the locality and geological relations of this trilobite, Professor Brongniart remarks, "un modéle en plâtre de trilobite envoyé à l'Académie des Sciences, en Juillet, 1819, par M. Hosack, et que j'ai rapporté, autant que la chose était possible, et toujours avec doute, au calyméne macrophthalme, a été trouvé dans le territoire d'Albany, êtat de New York. Or, les environs de cette ville sont indiqués, sur la carte géologique de M. Maclure, comme formés de terrains de transition. M. Hosack dit qu'il a été trouvé au milieu d'un rocher ardoisé, c'est à dire, dans un schiste probablement analogue à celui des environs d'Angers, qui renferme les Ogygies, et ce trilobite ce rapproche un peu de ce genre par la grosseur des tubercules qui recouvrent les yeux ou en tiennent la place." The rock in which the Calymene Anchiops is found, appears to be a clay slate.

CALYMENE DIOPS.* *Green.* Cast No. 8, and fig. 2.

Clypeo lobato plano; rugis tribus in lateribus frontis; tuberculis oculiformibus, eminentissimis et duplicibus; articulis octodecim; cauda rotunda.

This species is very distinct from every other Calymene that we have seen. The outline of the buckler is

* From the Greek for "Double Eyes."

lobate lunate; the front is very convex, and a good deal elevated above the cheeks or sides, from which it is divided by a deep furrow; on the posterior margin of the front on each side, close to the groove there is a prominent circular tubercle, before which there are three small transverse wrinkles. The cheeks are subtriangular; the oculiform tubercle is near the posterior superior angle, and is only separated from the tubercle on the front, by the furrow or groove, so that the animal seems to have had double eyes on each side; there are two curved lines on each side below the eyes, crossed near the front by a deep short canal. The middle lobe of the abdomen and tail is rather longer than the lateral lobes, and is rounded and very prominent throughout. It is composed of 18 articulations, seven of which appear to belong to the tail; it is, however, somewhat difficult to define the length of the tail with precision. The costal arches of the lateral lobes, particularly those near the tail, are bifurcate. Length almost three inches.

The original fossil, from which the cast was taken, is in the New York Museum. I am indebted to Mr. Rubens Peale, the liberal proprietor of that flourishing and important institution, not only for the use of it in this Monograph, but also for some valuable information relating to other species. The precise locality of Mr. Peale's specimen is not known, but in the cabinet of J. P. Wetherill, Esq., there is a fine head of the C. diops which was found in the State of Ohio. Both specimens are mineralized by the same kind of soft grey coloured limestone—and I have

but little doubt that they were derived from the same place.

CALYMENE MACROPHTHALMA.* *Brongniart.* Cast No. 9.

Clypeo antice, caudaque postice attenuatis, oculis magnis exsertis.

This species, according to Al. Brongniart, who first described it, is remarkable for the magnitude and protuberance of its eye-shaped tubercles, and by the prolongation of the anterior portion of the buckler, in the form of a snout.

The back is marked by 12 or 13 articulations, which are thicker than those of the tail. The tail is short, pointed, and without expansion.

The middle lobe, or front of the *buckler*, in this calymene, is said by Brongniart to be marked on its sides by three oblique plicæ or wrinkles, but we have not been able to discover this character in any of the specimens to which we have access; neither do they exhibit any remarkable prolongation in the anterior portion of the *buckler*, as stated in his specific character. The specimens which we have examined, agree pretty well with the representation he has given of the C. Macrophthalma, Plate I. fig. 5. A. B. & C. made from a drawing by Mr. Stokes, from a fossil found in Coalbrookdale, (Eng.)

This trilobite is common in several parts of the

* From the Greek for "Great eyes."

United States. According to Dr. J. E. Dekay,* the C. Macrophthalma is found on the Helderberg mountains, near Albany, and at Coshung creek, not far from Seneca lake, in the State of New York. It occurs also at Leheighton, in Pennsylvania—at the Falls of the Ohio, and at several other localities. We have examined a number of specimens of the C. Macrophthalma, contained in the rich cabinet of fossils, in the Academy of Natural Sciences, and have never seen any individual which resembles the fig. 4, Plate I. of Brongniart; and in no instance is the front of the buckler marked by three oblique folds, a character stated as peculiar to this species. The C. Macrophthalma, (variety) occurs in large quantities in Leheighton in Pennsylvania, and we are indebted to Mr. D. Keim, for some fine specimens from that locality.

The authority of Professor Brongniart is sufficient to place the C. Macrophthalma among the species of the United States, though we have been unable fully to identify it with his description.† He received a

* See Annals of Lyceum, Vol. I. p. 188.

† We have seen in the Cabinet of Mr. Featherstonhaugh, a fine group of trilobites, in the transition limestone, from Dudley, (Eng.) Among them there is a perfect head, which agrees exactly with the description given by Mr. Brongniart of the head of his Calymene Macrophthalma. If this belongs to the true macrophthalma, our species under that name is entirely distinct. Since our work had been prepared for the press, Dr. J. J. Cohen, of the Baltimore College, has shown us the fragment of a calymene from Berkley, Virginia, which agrees with Brongniart's de-

specimen, transformed into red jasper, from Prof. Ducatel, said to be found in the United States—no precise locality is given. Our model represents the animal which is supposed to be the one intended by Brongniart as the C. Macrophthalma of North America. It is, in our opinion, a variety of the C. Bufo. There can be no doubt that several species have been confounded under the name of C. Macrophthalma.

The following extract of a letter from Professor Ducatel to the author, referring to the locality of this species, will be read with interest.

"I cannot be positive as to my recollection of the locality of the fossil referred to by Brongniart and yourself, but believe it is one of several found by my friend Dr. M'Culloh, in the neighbourhood of Berkley Springs, Virginia. I regret that I have not in my possession another specimen to present to you."

CALYMENE BUFO. *Green.* Cast No. 10.

Clypeo rotundato, convexo, punctato; abdominis articulis sexdecim; cauda attenuata; corpore plano.

Buckler semilunate, front very large, rounded before and arcuated at the insertion of the middle lobe; surface convex, and marked with numerous depressed pimples. Mouth large, lunate, resembling that of a

scription of the macrophthalma, and with the above fossil from Dudley. We regret that the imperfection of the fossil prevents our giving a satisfactory cast of it.

toad or frog, with a narrow raised rim on the upper and under lip. Below the chin there are no pustulations. Cheeks small, triangular, and separated from the front by a deep, rectilinear furrow; the eyes in our specimen are much injured, but they are large, and near the upper angle of the cheeks. Middle lobe with a series of distinct double articulations. Lateral lobes wider than the middle lobe, ribs deeply grooved near their insertion; articulations of the abdomen twelve; of the tail ten. Length four inches and a half; breadth of the buckler nearly two inches.

This fossil was presented to me some time since by Thomas P. Johnson, Esq., who mentioned that it was found in New Jersey, but that he could not learn its precise locality. Near Patterson, in that State, some trilobites have been discovered—perhaps the C. Bufo may have been derived from that locality. It is composed of a dark greyish limestone, easily cut with a knife.

CALYMENE BUFO. Variety, RANA. Cast Nos. 11 & 12.

This fine specimen differs from the one above described, in having the front of the buckler rather smaller, and of a different contour. The whole of the shell is also covered with granulations, which only appear on the head of the other; this, however, may be only an imperfection in the specimens in our cabinet.

I am indebted to the Albany Institute for the originals of the models Nos. 11 & 12. They were found at

Seneca, Ontario County, New York, in dark, slaty limestone, which also contains cubical crystals of iron pyrites. A fortunate blow of the hammer has fractured the rock which contains this trilobite, so neatly, as to present us at the same time with the petrified animal in an almost perfect state, and also with the mould or matrix in which it was imbedded. This arrangement is beautifully illustrated by our models.

Genus Asaphus. *Brongniart.*

This genus derives its name from the Greek word Ασαφης—obscure. It embraces perhaps more species than any other genus of the family of trilobites. About twenty have already been discovered. Most of them are very characteristic and can easily be determined, but as the genus Asaphus, is intermediate between Calymene and Ogygia, it is sometimes a little difficult to decide the genus to which the inosculating species on each side, belongs.

In general, the Asaphs may be known by the body being very much depressed, and by the membranaceous development, which extends beyond the lateral lobes. The middle lobe of the abdomen, is rarely more than one-fifth the width of the body. As the abdomen and tail of the Asaph are the only portions of the animal commonly found entire, the distinctive characters of the genus above given, may generally be ascertained.

Professor Brongniart remarks, that the ribs of the *Asaph*, which correspond in number and position to

the articulations of the middle lobe, "are sometimes simple or undivided, at least in the post abdomen, but that they are always bifurcated in the *Calymene*." As far as our observations have extended, these remarks do not apply either in the one case or the other.

The head or buckler of the *Asaph*, is not so deeply divided into three lobes as the *Calymene;* they are, however, quite distinct. The oculiferous tubercles are in some species exceedingly well marked by a reticulated structure.

This genus often occurs at the same localities with the Calymene, though in some instances it seems to occupy rocks peculiar to itself. Dr. John Bigsby, in his list of organic remains occurring in the Canadas, states, that he never found a single species of the genus Calymene, on the north side of the River St. Lawrence, although the Asaphs were very abundant.* In his Sketch of the Geology of the Island of Montreal, he however observes: "Of Trilobites, the Asaph genus is the most abundant, they approach nearest the species *caudatus*, of Brongniart. I have found no entire Calymene, but many bucklers or heads of the Blumenbach species, some of them an inch and a half in diameter. They are found whole in considerable numbers in the vicinity of Quebec."†

* Silliman's Journal, vol. viii. p. 83.

† Annals New York Lyceum, vol. i. p. 214.

ASAPHUS LATICOSTATUS.* *Green.* Cast No. 13.

Cauda prælonga, pars ad marginem vix membranacea; cute coriacea, tuberculis minimis; costis latis, convexis et valde distinctis.

The fragments of this species, which we have examined, comprise ten articulations of the middle lobe, and the corresponding ribs of the sides, all in a very good state of preservation; the extent to which the membranaceous expansion reached beyond the tail and the lateral lobes is very apparent, but it has been unfortunately broken off all round. Our specimen appears to be a natural cast of the internal part of the shell, or the coriaceous covering of the animal.

The portion of this specimen of trilobite which still remains perfect, is two inches long, and three inches and a quarter broad. The middle lobe exhibits the appearance of a very exact and gradually tapering cone, its articulations being rounded and slightly flattened on the top. The ribs of the lateral lobes are nearly straight, slightly arched, broad, rounded, and gradually increase in width from the point of their insertion; they are simple or not bifurcated throughout, and are covered with very minute granulations, which are probably produced by the sandstone in which the animal is mineralized. The membranaceous expansion near the caudal termination, is a good deal prolonged.

The A. Laticostatus occurs in a light coloured fer-

* From the Latin for "broad ribbed."

rugenious sandstone, which contains a multitude of other fossil remains, particularly a large species of Productus and of Terebratula. It is said to have been found in Ulster county, in the State of New York, by the late Charles Wilson Peale, Esq., the distinguished founder of the Philadelphia Museum. During the memorable search after the bones of the *Mastodon Giganteum*, in the marl pits of that county, this enterprising naturalist procured our Asaph with many other remarkable petrifactions. The rocks which contain them were probably found not *in situ*, but were masses rolled from the neighbouring Shawangunk mountains,* which by some geologists are supposed to be a link in the grand chain of the Alleghanies. Mr. R. Peale, of New York, lately visited the rich repository of fossils in Ulster County, and procured a number of specimens of the A. Laticostatus, all of which he has kindly permitted me to examine. These are much smaller than our cast, but in many instances the caudal elongation is perfectly developed. The A. Laticostatus also occurs in the Helderberg mountains, specimens of which are in the Albany Institute.

ASAPHUS SELENURUS.† *Eaton.* Casts Nos. 14 & 15.

Cauda semilunari; costis angustis, valde distinctis; abdominis articulis duodecim; corpore convexo.

* The Lenape tribe of Indians, who formerly inhabited this district of country, gave the name of Shawangunk to this stupendous ridge of hills—a name which has been very properly preserved.

† Derived from *Selene*, moon, and *ouros*, tail.

I am indebted to Professor Eaton, for two specimens of this very interesting species. In his Geological Text Book, he thus describes it: "Tail crescent-form, or concavo-convex, with the convex side forward, upon which the post abdomen terminates: abdomen contains about 12 articulatious, with an abrupt termination equal in breadth to one-fourth of the length of the transverse lunate tail; the articulations of the side lobes gradually incline towards the axis of the body, until the last pair terminate at the tail. Found in transition limestone at Glenn's Falls, and Becroft's mountain, near Hudson. I have a specimen from Becroft's mountain, with part of the original covering of the animal remaining."

When we first noticed the remarkable lunate appearance of the tail of this Asaph, we supposed that it was occasioned by some accident, but there seems no doubt that this conformation is natural. In our specimens of this species, which are not however perfect, the articulations of the abdomen do not exceed 8 in number. The representation of this animal remain given by Mr. Eaton, plate 1, figure 1, is exceedingly inaccurate; it will confuse rather than illustrate the subject. Our cast and the drawing, we believe, are taken from the same specimen, which was kindly loaned by Mr. Eaton for this work. It is but justice to the amiable, industrious, and indefatigable author of the Geological Text Book to remark, that he regrets as much as any one, the insufficiency of his figures of the trilobites, to give any correct idea of the fossils they are intended to represent.

In the cabinet of the Albany Institute there are a number of specimens of the A. Selenurus. One of our models represents the natural mould made by the animal in the rock; the other is an impression taken from it, in order to exhibit the animal in a more satisfactory manner.

ASAPHUS LIMULURUS.* *Green.* Cast No. 16.

Cauda longa, spina munita sicut in Limulo; costis abdominis in spinis retrorsum flexis, desinentibus.

It is very much to be regretted that the abdomen and caudal end only of this remarkable Asaph have hitherto been discovered; it is, however, exceedingly gratifying that the fragment still remains in so perfect a state. It forms a part of the magnificent cabinet of organic remains belonging to J. P. Wetherill, Esq., now deposited in the Academy of Natural Sciences, of Philadelphia.

Dr. J. J. Cohen discovered a small specimen of this species at Lockport, New York, which he has presented to the Athenæum, in Baltimore.

Eight articulations of the abdomen, and ten of the tail, are all of this fine species that we have seen. The ribs, or costal arches of the abdomen have a deep furrow on their upper surface, commencing at the middle lobe, and terminating near their free extremities; these extremities appear all detatched from each other, and end in reflected points or spines, so as

* From two Greek words, which signify "Limulus tailed."

to give the side of the animal a serrate appearance. The costal arches of the tail are grooved through their whole extent, and present no spinous terminations. Beyond the membranaceous expansion of the tail, which is somewhat similar to that of the Asaphus Caudatus, there projects a single spine, like that from the tail of the *Limulus polyphemus;* this spine may be traced under the caudal membrane to its insertion into the middle lobe. A portion of the crustaceous shell is still entire, and it seems to have been covered with very minute granulations. A row of large granulations may easily be traced on each side of the middle lobe. Length of the fragment, one inch and a half. Breadth one inch and a fourth.

The A. Limulurus was found in the dark brown, shaly limestone, at Lockport, in the State of New York; it is associated in the same rock with the terebratula and several other fossils.

The singular spinous projection from the tail of this Asaph, furnishes another analogy, between the trilobite and the limulus; an affinity which was suggested by Dr. Dekay; and which has been argued with great ingenuity both by himself and Professor Wahlenberg.*

* See Nova Acta Regiæ Societatis Upsalensis: 1821. Also, Annals of the Lyceum of Natural History. New York. Vol. i. pages 179—185.

ASAPHUS CAUDATUS.* *Brünnich. Brongn.* Cast No. 17.

Clypeo antice subrotundato, postice valde emarginato, angulo externo in mucronem producto; oculis exsertis, conicis, truncatis, distincte reliculatis; post abdomine in caudam membranaceam, acutam extenso. (Vide Brongniart.)

The middle lobe of the buckler is marked by three transverse plicæ or folds on its posterior part, and its cheeks or lateral portions are triangular; the posterior exterior angles of which, are acute, and considerably elongated. The cheeks are furnished with conical, truncated, semilunar and externally convex tubercles, which were beyond all doubt the eyes of the animal, being reticulated as in those of the Limulus. The middle lobe of the back is narrow, and has twelve articulations. The lateral lobes are composed of double ribbed costal arches. Beyond the lateral lobes and the caudal termination, there is a smooth, thick membranaceous expansion, which forms an acute projection below the central portion of the tail.

The specimen in the Philadelphia Museum, by which I have identified this species, is marked as coming from Ripley, Ohio. It reposes on a fragment of ash coloured limestone—which contains also a mutilated specimen of what seems to be a calymene, and a few small terebratulæ, &c.

* From the Latin word for "tailed."

Dr. John Bigsby, in his "List of Organic Remains, occurring in the Canadas," states that the A. caudatus is frequently met with, thrown up by the water on the north shore of Lake Superior—on the bank of Rainy river—at the Lake of the Woods, and at several other places. In some localities they are astonishingly numerous, and so small as to be almost microscopic. They occupy indiscriminately limestone of every colour, but are most numerous in that which is brown or crystallized. They are composed of the kind of limestone in which they happen to be embedded.

We have seen a number of specimens of this species in the Albany Institute, in Mr. Wetherill's cabinet, and in the Baltimore Athenæum; but in all of them, the abdomen and caudal extremity only remain perfect: from their exact resemblance, however, to the same parts of the A. caudatus, figured by Brongniart, (plate 2, fig. 4, D.) we have no hesitation with regard to their identity. The description which we have given of the *buckler*, supposed to belong to our Asaph, is therefore taken from Brongniart, whose specimens were found at Dudley, the celebrated locality of the C. Blumenbachii.* The coriaceous membrane, which extends beyond the lateral lobes and forms the caudal

* In the first volume, 2d series, of the Transactions of the Geological Society of London, Mr. Weaver has published some highly interesting observations on the fossils found in Gloucestershire, England. The A. caudatus, he states, is there found in the transition limestone, though very much mutilated. (Vide p. 326.)

termination of our species, is not covered with minute dots, as in the European fossil; and if a new name is to be applied to it on that account, it may be called *A. glabratus.** M. Wahlenberg, has given the figure of a trilobite which he calls *caudatus*, but ours cannot be mistaken for that species, to which Brongniart has very judiciously applied the name of *A. meucronatus.*

The conical eye-like protuberances on the head of this species, are very remarkable, and so much resemble the reticulated eyes of the limulus, as to leave no doubt that they once contained the organs of vision.

ASAPHUS HAUSMANNI. *Brongniart.*

Cauda rotundata; cute coriacea tuberculis minimis spinulosis tecta.

In De la Beche's Geological Manual, there is a list, of the trilobites which have been discovered in the grawacke group of rocks. This list we have given in our introduction. Among the trilobites he states that the Asaphus Hausmanni has been found in the United States; as we have not seen the species, and presuming the author to be correct in his locality, we give the following description from Professor Brongniart.

* In the cabinet of G. W. Featherstonhaugh, Esq., I have examined a fine specimen of the A. caudatus, from Dudley, England, but could not perceive the minute dots on the tail, as mentioned by Brongniart.

I know, he observes, only the tail of this Asaph, but it is so different from that of other trilobites, that I do not hesitate to establish a particular species, upon the consideration of this part alone. Its general form is that of a semi-ellipsis; the middle lobe represents a very slender cone. The arched ribs of the lateral lobes are perfectly distinct and simple. I cannot perceive in them the slightest appearance of bifurcation. This sufficiently characterizes the species. But that which further distinguishes it from the others, are the small, elevated points, scattered, and of course rough (serrés), with which the skin or epidermis is covered, resembling, in this respect, the tail of the *Apus canceriformis*.

This fragment of an Asaph is in a homogeneous, compact, blackish limestone, which contains no other kind of petrifaction. I know not where it was found. It is in the cabinet of M. de Drée.

On plate 2 of Professor Brongniart's work, he has given figures to illustrate this species; fig. 3 A. represents the whole fragment, and 3 B. two of the ribs of the lateral lobes, magnified to show the arrangement of the tubercles, which are very peculiar.

From the above description it will be readily perceived, that the A. Hausmanni comes very near to the A. Laticostatus. There are, however, many striking differences, which will be obvious to those who compare our cast with the figures of Brongniart. The shape of the ribs, and the tubercles upon them; the form of the middle lobe and of the interstices between the articulations, are all peculiar to

each. The elongation of the tail in our species is alone sufficient to distinguish it. We have always been doubtful whether the minute granulations on our species were not produced by the sandstone in which it is petrified.

Upon what authority the A. Hausmanni has been considered as a species belonging to the United States we cannot determine. In the valuable and extensive cabinet of trilobites belonging to the Albany Institute, there are a number of specimens labelled with this name by Professor A. Eaton. If we mistake not, he mentioned to us that similar fragments of this fossil were sent by him to Brongniart, who, we understand, is the author of the list of trilobites found in the manual of De la Beche. The specimens which have been examined, both in the cabinet of Professor Eaton, and in that of the Albany Institute, are certainly not identical with the figures or descriptions published of the A. Hausmanni. Professor Eaton, in his Geological Text Book, at page 31, thus describes his A. Hausmanni:—"Tail rounded, and forming the middle of a circular arc whose centre is in the fore abdomen, near the head; covering tubercled or spined. Found in coral rag on the south shore of Lake Erie. Also, in its underlaying grit slate on the Helderberg." Some other trilobites mentioned in De la Beche's list as occurring in the United States, we have not been so fortunate as to meet.

ASAPHUS PLEUROPTYX.* Cast No. 18.

Corpore depresso; cute coriacea tuberculis minimis; costis striatis; cauda acuta, brevi.

This species like most other specimens of this genus, in our cabinets, is decapitated—every other part, however, appears to be in a good state of preservation.

The articulations of the abdomen and tail, which cannot readily be distinguished from each other, are seventeen in number. The middle lobe is flat, and regularly tapers to an obtuse lip; it is marked on each side with longitudinal impressed lines or little grooves. The costal arches on their upper side have a deep and narrow channel, running through their whole course. The costal arches of the abdomen have no membranaceous expansion beyond their terminations; this organization is only visible immediately below the end of the middle lobe, where it quickly finishes in an acute point. A large portion of the crustaceous shell remains, and is covered with distinct granulations; those on the tail are the least obvious.

This species approaches very near the A. caudatus, but the grooves on the middle lobe, the smallness of the costal arches, and the limited extent of the membranaceous expansion round the lower portions of the shell, will sufficiently distinguish it.

* From the Greek word for "grooved ribs."

Two specimens of this Asaph are in the cabinet of the Albany Institute. The one from which our cast is taken, was found on the Helderberg mountains; it is embedded in a light grey coloured limestone shale. The other specimen, which is much smaller, was discovered near the Genessee river, in the State of New York. The rock in which it occurs is identical in its constitution with the other. It contains other species of trilobites, and a number of shells.

ASAPHUS MICRURUS.* Cast No. 19. Fig. 3.

Cauda attenuata, acuta; corpore valde convexo; costis striatis; parte marginali vix membranacea.

This fine, large caudal termination of an Asaph is in the cabinet of the Albany Institute—and it is a subject of great regret, that all that has yet been discovered relating to this highly interesting trilobite, is to be seen in this fragment.

There are eighteen articulations of the tail and abdomen, which cannot be distinguished from each other. The middle lobe is composed of a series of straight, distinct, parallel articulations, very convex about the middle, so as to form a kind of longitudinal ridge down the back. The costal arches of the lateral lobes are very distinct, and are longitudinally striated or grooved on their upper surface, particularly those near the upper part of the animal. The membranaceous expansion is very narrow along the

* From the Greek, for "minute tail."

sides of the body, and forms a sort of hem; below the central portion of the tail it makes a short acute projection, which seems to be supported by a short costal elongation of the middle lobe. Length two inches and a half.

The A. Micrurus was found in the black fœtid limestone of Trenton Falls, by M. H. Webster, Esq., and by him placed in the rich collection of trilobites in the Albany Institute. The limestone in which this Asaph is embedded, is almost one entire mass of petrifactions. The general aspect of the A. Micrurus is very similar to that of a calymene—but judging from its structure, it could never contract its shell into a spherical figure. Its minute tail, and narrow membranaceous expansion round the terminal edges of the lateral lobes are quite peculiar, and determine it to be an Asaph.

ASAPHUS WETHERILLI.* *Green.* Cast No. 20.

Clypeo postice arcuato, sulcato; abdominis articulis duodecim; cauda vix membranacea; cute coreacea vix punctata.

The contour of this beautiful Asaph is very regularly ovate; unlike most of the remains of this genus, the buckler is still attached to the abdomen, though

* I have named this species in compliment to my friend, John P. Wetherill, Esq., whose magnificent cabinet of fossils in the Academy of Natural Sciences of Philadelphia, will ever remain as a monument of his discrimination, enterprise, and liberality.

one of the *cheeks*, and a portion of the *front* are obscured by the rock in which the animal is imbedded. The cheeks form spherical triangles. The oculiferous tubercles, though a good deal defaced, seem to have been circular and not lunate, as in the A. Caudatus. A raised, curved line passes from and over the eye, between it and the lateral lobe of the abdomen. The central lobe of the back is composed of twelve double joints, and that of the tail of six single articulations; where the epidermis or shell is perfect, all the articulations appear single. The last joint of the tail is longer than in any other of our species. The ribs of the abdomen are rather broad, and have a deep furrow scooped out along their upper surface; their extremities, where they can be discovered, are detached from each other, and terminate in reflected points, like those of the A. Limulurus. The costal arches of the tail are delicately grooved, and terminate in the membrane. The membranaceous expansion round the edge of the tail is very narrow, and appears to form no projection beyond its central part. The whole epidermis is finely marked with granulations. Length one inch and three-fourths—breadth one inch and one-fourth.

This interesting species was found in limestone shale, near Rochester, in Munroe County, N. Y.; and is now in the valuable cabinet of the Albany Institute. An accidental fissure of the rock disclosed not only a fine specimen of both the mould and the cast of this animal, but also another individual of the same species in contact with it. From the peculiar attitude

which these fossilized animals maintain towards each other, they appear to have been combatants at the very moment when the catastrophe occurred which produced their mineralization. In the Museum of the Garden of Plants at Paris, there is a large specimen of two fossil fish, which are supposed by many to have been destroyed and covered with mineral matter, when one of them was in the very act of swallowing the other. Mr. Bakewell, however, who accurately examined this specimen, is of opinion, that the two heads of the fish had been pressed together by the superincumbent weight.

Genus Paradoxides. *Brongniart.*

The animals arranged under this generic name, include the organic remains described by Linné as Entomolithus paradoxus, and Brongniart has given the specific appellation which the great Swedish naturalist applied to these singular animals, out of compliment to him, though he considers it quite inappropriate. The late Professor Dalman calls this genus Olenus, and quotes Paradoxides as a synonyme, but the term of Brongniart seems to have the priority, and therefore must be preferred.

The animals belonging to the Paradoxides have the body very much depressed, and the lateral much wider than the middle lobe.

The buckler is nearly semicircular, the cheeks are destitute of eyes, and the front is marked with three

transverse furrows. This last character is probably not a permanent one.

But the most distinguishing character, is the prolongation of the costal arches, particularly those of the tail, beyond the membrane which they are supposed to support; the termination of these arches is in teeth or spines. Some species of the Asaph have prolongated extremities to the ribs of the abdomen, but we have never seen them on the arches of the tail.

This genus is said to comprise a great number of species, but the only one found in North America, as far as our knowledge extends, is that described by J. J. Bigsby, in the fourth volume of the Journal of the Academy of Natural Sciences of Philadelphia. As we have not seen the specimen, we add the description of it in the author's own words.

PARADOXIDES BOLTONI. *Bigsby.* Figure 5.

Oval, blind; surface with small tubercles and striæ; clypeus rounded before; exterior angle extending in a broad spine; abdomen fourteen jointed; segments recurved, falcate; tail membranaceous and serrate.

The shape of this individual is oval, approaching ovate; it is moderately flat; the whole length is five inches and four-fifths; its breadth across the middle is four inches and nine-tenths; wherever the cutis is not removed, it is covered profusely and irregularly with small tubercles. The denuded portions in this specimen, for the space of three quarters of an inch

from the external margin, is, in a very small degree, depressed, and displays a number of broken and continuous striæ, parallel to that margin. There are no traces of organs of vision. The buckler is nearly the segment of a circle; anterior edge, in the present case, imperfect; it is four inches and three-fifths broad, and one inch and one-ninth long at the centre; it joins the abdomen by a somewhat sinuous transverse line; cheeks and front of equal breadth; the former are flat, but rise at the sharp ridge by which they unite with the front; they are triangular in shape; their outer angles terminating by an acute tip. The striæ mentioned above are here not quite parallel to the external border; the front is a shallow depression; rounded but tapering anteriorly; it is intersected from above on each side obliquely towards the mesial line, by a ridge bifurcating downwards; another smaller ridge nearly bisects the front perpendicularly.

The abdomen and post abdomen are not distinct. The abdomen exclusive of the cauda is three inches and a half long; it exhibits fourteen costæ varying indiscriminately from one-fifth to one-fourth of an inch in breadth, except the three inferior ones, which are rather broader; they occupy the whole abdomen without membranaceous interspaces, and are separated by a black sulcus, not always well defined, and sometimes a line in diameter. Each costa is canaliculated from the upper and under angle to the tip.

The middle lobe is separated from the lateral by a shallow, rude sulcus, which however, does not al-

ways destroy the continuity of the costæ, as they cross it; this lobe is slightly convex, one inch and a half broad at the top, and so continues to the sixth costa, after which it gradually contracts, until at the bottom it is one-fifth of an inch broad, subsiding insensibly into a flat membrane-like surface; its longitudinal sulci pass one inch farther downwards, and expanding a little, unite with the costæ on each side the posterior edge of the space included by them, being dentated.

The lateral lobes are quite flat, one inch and a half broad anteriorly, and, by gradual prolongation, become at the fourth costa one inch and four-fifths in breadth; this dimension is maintained to the ninth articulation, when it slowly decreases to one inch at the bottom; the recurvature of the costæ is gentle in the upper eight, but then decreases rapidly. Their extremities, advancing two-fifths and four-fifths of an inch into the embedding rock, are falcate with their raised black edges, and clearly marked points.

This trilobite was found by Lieut. Bolton, at Lockport, in the state of New York, in the black, shaly, horizontal limestone forming the lower part of the ravine by which the Erie canal ascends the *parallel ridge* of Lake Ontario. Dr. Bigsby remarks on this locality, "I am not prepared to assign to this limestone its exact place in the series of geological formations; it is above the saliferous sandstone, and therefore more recent than the rocks best known as abounding in trilobites." We have, therefore, in this instance, another fact, which demonstrates that blind

trilobites are not confined to a geological period more remote than that which has produced the animals with oculiferous tubercles.

Genus Ogygia. *Brongniart.*

In the vast quarries of slate at Angers, in France, there is frequently noticed two very remarkable organic remains, which have for a long time excited the attention of naturalists. To receive these curious relics, Professor Brongniart established the genus, Ogygia, which he thus characterizes. Body much depressed—elongated into an ellipse, terminated in points—nearly equal at its extremities, and not capable of contracting itself into a spherical form. The buckler is bordered by a slight longitudinal furrow, rising from its anterior extremity, and its posterior angles terminating in elongated points. The abdomen has eight articulations, and its longitudinal lobes are not very prominent. The eyes are neither prominent nor reticulated and there are no other protuberances on the buckler.

In Professor Brongniart's original work on the Trilobites, he has described the two specimens from Angers, under the specific names of Guettardi, and Desmarestii, in compliment to M. M. Guettard and Desmarest; and in De La Beche's Manual of Geology, we are informed that he has since identified two other species; one of which is supposed to be found in North America; this he calls *Ogygia Sillimani;* the banks of the Mohawk River, near Schenectady,

is the locality from which it is said to have been derived.

As we have not been able to find any detailed account of this species, we have admitted both it and the genus to which it is said to belong into our Monograph exclusively on the high authority of Professor Brongniart, as quoted in the Manual of Geology. We are not ignorant of the species of Trilobites found near Schenectady, and if permitted to offer a suggestion on this subject, it would be, that the description of the American ogygia, was made out by its distinguished author from the fragment of an Isotelus. The Isotelus is not uncommon in that vicinity, and one of its extremities might, even by a very close observer, be mistaken for that of an Ogygia—especially by those who are not perfectly familiar with the Isotelus.

Genus Isotelus. *Dekay.*

This fine genus of trilobites was established November, 1824, by my friend James E. Dekay, M. D. It embraces a considerable number of species so analogous to each other, that except in a very few cases, it is exceedingly difficult to point out their distinctive characters. Some of the species of Isotelus, appear to have reached a greater size than any other trilobite. In the cabinet of P. A. Browne, Esq., there is the fragment of one, which must have been fourteen or fifteen inches long.

The Isotelus is found in several parts of North

America, but most abundantly in the black transition limestone, in the northern section of the country. The richest locality, not only of this genus, but also of the Calymene and the Asaph, is Trenton Falls, on West Canada Creek, about 13 miles to the north of Utica, in the state of New York. The following extracts from the notes of Professor Renwick, which accompany Dr. Dekay's account of the Isotelus, will give some idea of this vast depository of the medals of ancient zoology. West Canada Creek, is one of the principal branches of the Mohawk River. At Trenton Falls it has worn itself a passage through the rock for the distance of nearly two miles, forming a series of water falls; and has thus laid open to view the strata to the depth of probably 300 feet. The layers of the rock thus disclosed are nearly horizontal, and of various thicknesses: they are composed of limestone, with the exception of numerous thin veins of argillaceous matter. The higher strata are composed of carbonate of lime nearly pure, of a light grey colour and crystalline structure. At greater depths it is more compact and darker in colour, and finally it appears quite black and highly fœtid.*

Animal remains are contained in every part of the rock; besides several genera of trilobites, we have several species of orthocera. Encrinites and Fungites—Nautili—Terebratulæ and Producti, are quite common. The favosites here are sometimes six inches in diameter, and in such numerous columns,

* See Annals of N. Y. Lyceum, vol. i. page 185.

as to have induced the late worthy proprietor of this interesting spot, Mr. J. Sherman, to consider them as analogous in structure to the basaltic columns of Staffa and the Giant's Causeway; he therefore maintains the extravagant theory that these columns are nothing more than gigantic favosites.* We visited this famous locality of trilobites not long since, and were almost as much delighted with the sublimity and grandeur of the cataract, and the picturesque and romantic character of the glen, as with the reliques of olden times, which are scattered here in such profusion.

The genus Isotelus, derived from ἴσος, equal, and τελος, extremity, is thus characterized by Dr. Dekay.

Body oval—often contracted, not unfrequently extended.

Head or buckler large and rounded, equalling the tail in size, but with two oculiform tubercles.

Abdomen with eight articulations.

Frontal process beneath, with two semilunar terminations.

Post abdomen or tail, broad, expanded with indistinct divisions, as large as the buckler.

Longitudinal lobes very distinct.

Other distinguishing marks by which this genus may be known, have been given in our introduction.

* See a Description of Trenton Falls, by John Sherman, p. 17.

Isotelus Gigas. *Dekay.* Casts Nos. 21 and 22.

Head representing a spherical triangle, surface punctate, convex, descending from between the eyes to the anterior border, which has a narrow raised rim; posterior extremity concave and corresponding to the articulation of the abdomen. Eyes elevated, prominent, sub-pedunculated; cornea oblong, lunated, highly polished; *abdomen* with eight distinct articulations, the middle lobe double the size of the lateral one: these latter are continuous with the middle lobe, have a deep furrow impressed on their upper surfaces, which becomes gradually effaced towards their narrow free extremities. These lateral lobes are rounded at their extremities, and flattened in such a manner as to allow each lobe to slide easily under the lobe immediately preceding. *Tail* subtriangular, convex, equalling the head in size, with the posterior termination rounded. On the centre of its surface, when accidentally decorticated, a slight elevation may be traced, if the specimen be held in a certain light, which appears to be a continuation of the middle lobe; this extends to within a short distance of the posterior angle of the tail, when it is either entirely effaced or terminates in an abrupt truncation. Another elevation runs parallel to and at a short distance from the edge of the tail. These elevations are connected by obscure parallel lines, imitating the spaces between the lateral lobes. When the tail is fractured on the borders, a semilunar depression is

visible, exhibiting concentric striæ. The whole surface of the animal has a jet black polish. Length from 6 to 12 inches.

The original of our cast is in the cabinet of J. P. Wetherill, and was found near Cincinnati, Ohio. It is of a yellowish colour, and occurs in argillaceous slate. Specimens are common in most cabinets of American fossils. The Lyceum in New York, possesses a fragment of an individual of this species, which must have been at least 17 inches long. Our cast, No. 22, is from the gigantic tail in the cabinet of P. A. Brown, Esq. Mr. Stokes describes the I. gigas as a new species under the name of Asaphus Platycephalus, in Geolog. Trans. vol. i. N. Series. His specimen was found in the limestone of St. Joseph's, Canada.

Isotelus Planus.* *Dekay.* Cast No. 23.

Head more rounded than the preceding, and less elevated. *Tail* flat, rounded. Total length two inches and one-tenth. Breadth one inch and one-tenth. Length of the head, six-tenths—of the abdomen, eight-tenths, and of the tail seven-tenths.

Dr. Dekay is of opinion that this species may possibly prove to be the young of the preceding. The relative proportions of its buckler and tail vary

* The general usage of naturalists is to prefix a short Latin caption to the species which they discover—but as some authors do not follow this fashion, we are satisfied to suffer their descriptions to stand without it. We believe, indeed, that the time is not very distant, when every author will be expected to publish his discoveries in his vernacular tongue.

considerably from those of the I. gigas; and the depth of the lateral lobes, which exceeds three-tenths of an inch, would almost of itself determine it to be a new species. The original, from which our cast was taken, is in the cabinet of J. P. Wetherill. It was found near Newport, Kentucky, and occurs in argillaceous slate. The fossil is of a dirty yellow colour.

Isotelus Cyclops.* *Green.* Cast No. 24. Fig. 7.

Clypeo antice attenuato, plano; oculis rotundis, proximis; cauda ovata, acuminata.

The head of this species is much more elongated than it is in the two preceding species. The anterior portion of the buckler is much prolonged. The eyes are approximate, rounded, and near the posterior edge of the head. The abdomen is furnished with eight distinct articulations; the middle lobe is scarcely broader than the lateral lobes; tail rather broader than the head, and ovate; posterior termination more rounded than the buckler. Length nearly three inches.

The specimen from which our model was taken belongs to the Albany Museum. No label is attached to it, but I was informed by Mr. Meach, one of the proprietors, that it was found in the western part of the State of New York. It is embedded in an ash-coloured limestone. The specimen is a good deal worn—but the peculiar form of the eyes, and the nar-

* From the Greek for "round eyes."

rowness of the middle abdominal lobe, clearly distinguish it from either of Dr. Dekay's species.

ISOTELUS MEGALOPS.* *Green.* Cast No. 25.

Clypeo antice subrotundato, postice arcuato; oculis magnis, rotundis, eminentissimis; cauda suborbiculari, limbo lato; articulis abdominis octo.

The buckler in its contour resembles very much the head of the I. gigas; it is, however, rather more rounded before, and arcuated behind. The oculiferous tubercles, are very peculiar, being very large, round, and exceedingly prominent. They have a good deal the appearance of solid hemispheres placed on the forehead of the animal. They are exactly on a line with the two abdominal furrows. The abdomen is composed of eight distinct articulations; the middle lobe is rather larger than the lateral lobes. The tail is suborbicular, convex, and rather less than the head. Length nearly five inches. Breadth almost three inches.

This magnificent Isotelus was obtained near Trenton falls, in New York, by P. A. Browne, Esq., and now forms a part of his fine collection of fossils, in this city. It occurs in black transition limestone. It differs essentially from the I. gigas of Dekay, in the magnitude, collocation, and contour of the eyes. Those of the I. gigas are oblong and lunate, and nearly half the distance between the anterior and the

* From the Greek for "great eyes."

posterior edges of the buckler; those of the I. Megalops are not only much larger, but they are round, and very near the posterior border of the head.

ISOTELUS STEGOPS.* *Green.* Casts Nos. 26 and 27.

Clypeo antice, caudaque postice attenuatis; cute coreacea punctis minimis.

The head of this species is nearly in the form of a spherical triangle; its anterior edge is vertically flattened all round, but does not produce a narrow raised rim, such as is described by Dr. Dekay, to belong to the I. gigas. The eyes are prominent, and rather nearer the lateral edge of the buckler, than to its posterior border. The shell of the buckler forms a remarkable projection over the top of each oculiferous tubercle, something like an eye-lid. Continuous with the edge of this cuticular projection, there is a curved linear depression, which terminates on both sides, at the edge of the buckler. This kind of suture, though remarkably developed in this species, is not peculiar to it, being more or less distinct in most of the Isoteli. The articulations of the abdomen are lost; there can be little doubt, however, that they were eight in number. The tail is subtriangular, and less in magnitude than the buckler.

This fossil is among the number of fine specimens in the cabinet of J. P. Wetherill. It is in a rolled or

* From two Greek words, which signify "covered eyes."

contracted attitude, and is somewhat distorted. We have given, however, models of the head and the tail, in two distinct pieces. The external shell, or calcareous covering, is more perfect in this specimen than in any other we have ever seen. A considerable portion of the under side of the anterior part of the buckler, is also well preserved, and perfectly coincides with the figure and description given of it by Dr. Dekay and Mr. Stokes. There is another fragment of an Isotelus in the cabinet of Mr. Wetherill, showing eight articulations of the abdomen, which probably belongs to another individual of this species. The dorsal shell is in a high state of preservation. This species is embedded in clay slate, and was found in Newport, Kentucky.

Genus Cryptolithus. *Green.*

Among the numerous organic relics embedded in black limestone at Trenton Falls, in the State of New York, there is often found the fragment of a trilobite which cannot properly be referred to any of the genera already mentioned. Dr. J. Bigsby, in his Sketch of the Geology of the Island of Montreal, has figured and described a fossil which occurs at that place, which approaches in its specific characters to the fragments found at Trenton—but he does not suggest for his relic any name. Professor Brongniart has also represented, plate 4, figs. 5 and 7 A. B. C., the fragments of trilobites from Russia and from Llandillo, in Wales, which seem to differ but

little from those above noticed, these are also without names. Under such circumstances, we have thought it expedient to group these relics under the generic term of Cryptolithus, a name analogous to Calymene, Asaphus, Ogygia, and Agnostus, and which may with propriety be applied to the animal, should it ever be discovered entire.*

Body, contractile.

Buckler, lunate, convex, outer edge surrounded by a semicircular, reticulated, or tessellated border.

Front or middle lobe of the buckler very protuberant.

Oculiferous protuberances, none.

Abdomen, much compressed, trilobate.

CRYPTOLITHUS TESSELLATUS. *Green.* Cast No. 28, and Fig. 4.

Clypeo rotundato, fronte valde convexo, capite antice semicirculari margine tessellato ornato.

Outline of the buckler hemispherical, the edge surrounded by a semicircular border of tessellated or rounded punctures, in three concentric rows in front —on each side near the posterior angle of the buckler, these rows of punctures are more numerous; the front is highly convex; is rounded before, and

* Since the above was written, and the C. Tessellatus published, I have received a fine specimen of this trilobite from Professor Eaton, in an almost perfect state, so that the entire animal can now be described.

gradually tapers towards the abdomen. The cheeks form spherical triangles, and are entirely destitute of oculiferous tubercles or any other markings; their posterior angles project beyond the sides of the abdomen. Abdomen and tail very much compressed, and composed of about ten articulations; costal arches of the lateral lobes grooved; tail attenuated. Whole length half an inch.

The Cryptolithus Tessellatus, resembles a good deal the Entomostracites Granulatus of Wahlenberg, and which Dr. Dalman calls Asaphus Granulatus. The figure of this animal given by Brongniart, table 3, fig. 7, appears to be quite imperfect, and is very unlike, except in the buckler, the representation of Wahlenberg's fossil, given by Dalman, table 2, fig. 6. Though the angles of the buckler in the Asaphus Granulatus are much more elongated than those of the C. Tessellatus, it may perhaps be another species of the same genus.*

* The following, is Dr. Dalman's description of the Asaphus Granulatus:—

A. trunco sexarticulato pygidioque lævibus, capite antice semicirculari margine granuloso, angulis posticis extensis corpore longioribus.

Animalculum singulare, inversum si inspicitur, lyram forma fere similans. Caput antice semicirculare, margine distincto, serie submoniliformi e granulis approximatis ornato, discus capitis lævis, sed ambitus intra marginem punctis elevatis obsitus. Hic ambitus, una cum margine, truncum quoque amplecti videtur, ad pygidii basin usque, ubi in cornua lævia, trunco multo longiora, abit. Glabella antice fere clavæformis, ad basin utrinque emittens lobi rudimentum. Truncus brevis lævis segmentis constans

The animal described and figured by Dr. J. Bigsby, to which we have already referred, seems rather different from our species. His specimens were found at Montmorenci, near Quebec, (Canada) more than an inch and a half in diameter. The following are his remarks on this trilobite.* "The front of the buckler is remarkably convex, and has on each side near the base, three very small transverse lines, scarcely to be called depressions, corresponding to the sulci so strongly marked in the genus Calymene. There is frequently, but not universally, a very minute pisiform process on the centre of the front. The whole upper edge of the buckler is always surrounded by a very ornamental semicircular border, sometimes semi-elliptical, of punctures placed in the meshes of a net-work in high relief and arranged close together, in rays, passing perpendicularly from the buckler and forming at the same time when observed transversely, curved lines parallel to its upper rim or edge, excepting at the sides, where they diverge, leaving a space occupied by other lines of dottings, parallel to the former, but speedily terminating on the cheeks of the buckler. The lines which

tantummodo sex, rhachide angusta. Pygidium breve, rotundatum, læve; adeo parvum ut ne quidem capitis disco respondeat.

Obs.—Oculos atque suturam facialem ex autopsia describere licet.

Vide Om. Palæaderna eller de sa kallade Trilobiterna af. J. W. Dalman, pages 50—4.

* See Geology of the Island of Montreal, in Lyceum of Nat. History, N. Y. p. 214.

are complete from side so side, are four in number. The imperfect additional ones, vary from two to four; the smallest and inner, consisting only of two or three punctures. A plain edging includes the semicircle of punctures. In the beds of these casts, the places of the punctures are shown by small conical elevations, and those of the ridges of the net-work, by corresponding depressions."

Should this prove to be a distinct species, we propose to call it *Cryptolithus Bigsbii.*

The *Nuttainia Concentrica* of Professor Eaton seems also very nearly allied to this species; he describes it as having "four or five concentric arcs of punctures in front of the buckler, separated by alternating arcs of fine elevated ridges." The genus Nuttainia, to which he refers this species, cannot include it, and the N. Sparsa; for these two relics have scarcely a single essential character in common; we have, therefore, confined the genus Nuttainia, to the species which he calls *Sparsa.*

The Cryptolithus Tessellatus is very common at Trenton falls. In the transition limestone at Glenn's falls, in the state of New York, during a very short visit to this place, Dr. R. Harlan procured a large number of this fossil, but only the buckler, the projecting front of which exhibited a pisiform protuberance above the level of the strata. Mr. Eaton says that the N. Concentrica "occurs in the wacke variety of transition of argillite, on the Champlain canal," between the town of Waterford and the

Mohawk river. The specimen in my cabinet, from which our cast was made, is from that place.

The Cryptolithus Tessellatus occurs also in the limestone which, according to Dr. Bigsby, overlays the sandstone in the island of Montreal. At most of its localities, it is associated with the Isotelus, the Calymene, and with several species of Asaphus. The Cryptolithus, which is entirely destitute of eyes, being thus found with the oculiferous species, is an interesting fact, and controverts the opinion of Professor Wahlenberg, that the trilobites, which are without eyes belong to a geological epoch more ancient than those which are furnished with oculiform tubercles. That organic remains furnish us with the most satisfactory evidence of the identity or dissimilarity of certain formations, is a disputed point with some geologists* It cannot reasonably be doubted, that new and isolated facts have been made the basis of a too hasty generalization. On this subject Count Rasoumowsky makes the following remarks:—"Les divers gisemens des Trilobites ne me semblent pas non plus pouvoir être déterminés avec quelque précision. M. Brongniart paraît admettre que les trilobites aveugles ne se trouvent que dans de tres anciennes formations dans des schistes et des calcaires de transitions; mais nous avons donné la description d'un trilobite [without eyes] des bords de la Yaousa prés de Moscow, qui n'appartient certainement pas aux formations de transition, ce qui me

* See Eclectic Review, for July, 1832.

donne lieu de croire que de nouvelles recherches et de nouvelles observations, prouveront qu'il n'est pas strictement vrai qu'en France, en Angleterre, en Russie, *il n'existe point de trilobites entiérement privés d'yeux*, comme le dit le savant auteur que je viens de citer." See Annales des Sciences Naturelles, Vol. 8. page 195.

Genus Dipleura. *Green.*

Body, contractile, not much depressed, and slightly tapering.

Buckler, pustulous, trilobate, cheeks protuberant, with oblique, annular, oculiferous tubercles.

Abdomen, with fourteen articulations, not lobate, the ribs double.

Tail, suborbicular, not so large as the buckler, covered with an epidermis.

This genus derives its name from two Greek words, which signify double ribs; many of the trilobites are thus characterized; but in no species, is this organization so remarkable as in those which belong to the Genus Dipleura. The expansion of the tail resembles, in some degree, that of the Isotelus, but other obvious characters sufficiently distinguish it from that interesting genus. The fossils arranged under this section are larger than most other trilobites.

DIPLEURA DEKAYI. *Green.* Casts No. 30, 31, and Figs. 8 & 9.

Clypeo lunato punctato; abdomine quatuordecim articulis duplicibus vix lobatis; cauda suborbiculari; limbo lato convexo integerrimo; oculis oblique deflexis.

The buckler is subtriangular, and covered with granulations; the anterior portion of our specimen being mutilated, we cannot determine its form exactly. The cheeks are very prominent, and swell up gradually towards the oculiferous protuberances, which are oblique, and marked at their apex with a depression, so as to give them an annular appearance. The abdomen is crossed by fourteen double distinct articulations, not interrupted in their course, by the two longitudinal furrows, so common in most of the trilobites; but owing to certain curves or irregularities in the ribs near their lateral termination, a trilobate appearance may in some specimens be detected. Tail suborbicular, convex, and covered with a thick epidermis.

The specific name of this species was given in compliment to Dr. James E. Dekay, of New York, whose valuable paper on the genus Isotelus, first directed my attention to the American trilobites.

The D. Dekayi has been found in several districts of the United States; at Lockport in the State of New York, it is not uncommon. The small specimen from which our cast of the abdomen and caudal

end was taken, is in the fine cabinet of Mr. William Hyde, who permitted me to use it with his wonted liberality and kindness. It is said to have been found in Northumberland, Pennsylvania, and occurs in grey carbonate of lime. In the Philadelphia Museum, there is a fine fragment of this species, in which there is embedded some crystals of iron pyrites; it was obtained in Ulster County, New York. In the cabinet of the Academy of Natural Sciences, there is a longitudinal and hollow fragment, filled with ochre, and the oxide of iron; it is labelled from Lockport, New York. At Mount Hope Institution, near Baltimore, there is also a good specimen from the same locality. In the *Clinton collection*, owned by the Albany Institute, there is a large extended fragment, nearly five inches long. It is embedded in brown limestone, and was found in Madison County, N. Y. There are twelve articulations of the abdomen remaining, and the epidermal covering of the tail is distinctly marked with numerous dots. In the same collection there is another large fragment of this species, consisting of the tail and fourteen articulations. It was found in Steuben County, New York; and occurs in grey limestone. It is slightly contracted and very much depressed laterally. There is also a head in the same kind of limestone, from Cazenovia, Madison County, New York. In the cabinet of the Institute there is another specimen of this species, about six inches in length, and nearly perfect; it is also embedded in a similar rock, and was brought from Rochester, Munroe County, New York.

The original of the head from which our cast was made, is in the cabinet of P. A. Browne, Esq., and was found by that enterprising geologist near Lehighton, Pa.

Genus Trimerus.* *Green.*

Body, contractile, tapering, compressed.

Buckler, pustulous, indistinctly lobate, with only two small elevated oculiferous tubercles.

Abdomen, with thirteen distinct, double articulations—divided into three lobes by a slight longitudinal furrow.

Flanks, or lateral lobes, not so broad as the middle lobe.

Tail, tapering to an obtuse point, pustulous, and marked with ten articulations.

This genus resembles in some respects both the Calymene and Dipleura. The form of the buckler, the position and structure of the oculiferous tubercles, and the scarcely lobate divisions of the abdomen, will readily distinguish it from the Calymenes. The articulations of the tail, not being covered with a shelly crust, is a character too obvious to confound it with the genus Dipleura. There is, we think, a beautiful chain of gradations of resemblances, between the Isotelus, Dipleura, Hemicrypturus and Trimerus. The lobes of the abdomen of the Isotelus are very distinct, and the articulations of the tail are hid by a broad thick shelly crust. The

* From the Greek for "three divisions."

lobes in the Dipleura are scarcely apparent, the ribs more numerous; and the covering of the tail much smaller. The lobes of the Hemicrypturus are like those of the Isotelus; but the lateral ones only of the tail are covered. In the genus Trimerus the lobes are like those of Dipleura, but the articulations of the tail are exposed.

TRIMERUS DELPHINOCEPHALUS. *Green.* Cast No. 32, and Fig. 1.

Clypeo semilunari, antice compresso; oculis minimis, enimentissimis; articulis duplicibus vix lobatis; cauda attenuata; corpore tuberculata.

In the rich cabinet of American fossils in the Albany Institute, there are two fine specimens of this species, and I am indebted to that rising and liberal institution, for the use of them in the present work. Our cast is made from the smaller and more perfect specimen of the two. The outline of the buckler forms an irregular semi-ellipse. The front is convex between the eyes, and very much depressed anteriorly, so as to form a sharp edge. The posterior part of the buckler is marked with a transverse groove parallel with the articulations of the back. The cheeks are small and triangular; the small elevated eye-shaped tubercles being placed in the middle, nearly equidistant from each of the angles. The eyes are not reticulated, the summit of each tubercle only presenting a plain oval foramen. The middle

lobe of the abdomen is much broader than the lateral lobes, and has 13 distinct, double articulations. The side lobes are curved, and each costal arch is flattened anteriorly near their lower extremities, no doubt for the purpose of enabling the animal to roll itself into a ball. The tail is tapering, and is composed of ten articulations. The crustaceous covering is here more thickly deposited than on any other part. The entire shell seems to have been covered with minute elevated dots; these are beautifully distinct on the buckler and on the tail. Whole length of the specimen described, not quite two inches.

The other specimen of this species in the cabinet of the Albany Institute, is a large caudal end, three inches and a half long, entirely perfect. Both of these fossils were brought from Williamsville, Niagara county, New York. They occur in a dark shelly limestone, filled with other petrifactions. The calcareous matter which has mineralized the trilobite, in this instance, as in most others, is of a much darker hue than the surrounding rock.

Genus Ceraurus. *Green.*

Body, very much depressed, and slightly tapering.

Buckler, scarcely trilobate; cheeks large, flat, with small remote oculiform tubercles; posterior angle of the buckler spinous.

Abdomen, with twelve articulations.

Tail, rounded at the end, but terminating on each side with two slightly curved spines.

The name of this genus is derived from the remarkable spinous projections from the caudal end; this peculiar organization separates it widely from the other genera. The *Paradoxides Spinulosus* of Wahlenberg, which is supposed to be the old *Entomolithus Paradoxus* of Linné, the fossil, with which all the trilobites were for a long time confounded, has not only projecting spines from the tail, but from all the costal arches of the lateral lobes. The presence of eyes or of oculiferous tubercles in the *Ceraurus*, would alone be sufficient to separate it from the genus to which that interesting fossil belongs. In the eighth volume of Annales des Sciences Naturelles, Count Rasoumowsky has figured and described the fragment of a very curious relic, which seems to be an intermediate link between our genus and paradoxides; in addition to a number of filamentous elongations of the costal arches, a curved spine seems to project from the end of the tail, as in the *A. limulurus*. No name is given to this trilobite, which appears to have been found on the banks of the Yaousa, near Moscow, where it occurs in black, coarse, argillaceous schistus. The Ceraurus is probably a very rare animal remain, as we have only met with it, in the unrivalled cabinet of trilobites belonging to the Albany Institute.

CERAURUS PLEUREXANTHEMUS. *Green.* Cast No. 33. Fig. 10.

Clypeo postice arcuato, angulo externo in mucronem valde producto; oculis minimis remotis, post-

abdomine in spinam arcuatam acutam utrinque extenso.

The exact contour of this species cannot be perfectly ascertained from our specimen; it seems, however, to have been lunate. The horns of the crescent which form the posterior angles, are very distinct, and they project like curved spines, some distance on each side of the head. The middle lobe or front is faintly scalloped on each side along the cheeks. The cheeks are rather large, and are furnished with two small oculiform tubercles, very remote from each other, and quite near to the anterior portion of the buckler. The abdomen is composed of twelve articulations. The lateral lobes of the abdomen are flat, and each of the ribs, at about half their extent, is marked on the upper surface, with an elevated pimple. These little pustules are nearly on a line with the oculiferous tubercles of the buckler, and present two parallel ranges down the body, one on each side of the middle lobe, and are terminated by a curved spine, which projects to some distance beyond the tail of the animal. Length one inch and a fourth.

This remarkable organic relic was found near Newport, in the State of New York. It is embedded in black limestone shale, and so exceedingly depressed is this animal, that a very thin lamen of the slate removed from the surface would destroy every vestige of its appearance. I am indebted to my early friend, Professor T. R. Beck, for the use of this valuable petrifaction, which now belongs to the cabinet of the Albany Institute.

Genus Triarthrus. *Green.*

Body, slightly convex; contractile?

Buckler?

Abdomen, with three articulations, side lobes longitudinal, narrow, and wedge-shaped.

Tail, broad, rounded, without any membranaceous expansion.

The name of this genus is derived from the circumstance, that the abdomen has but *three* articulations; an organization which is very peculiar. These curious fossil animals are very abundant in the rocks in which they are found; but though I have examined a multitude of specimens from different localities, no vestige of the head or buckler could, on the most minute examination, be discovered. Whether these animals, during their petrifaction, were so contorted or rolled up, as to bring the extremities of the body together, in such a manner as to present the posterior folded part only to the view; or whether the buckler has been destroyed by the process of mineralization, as appears frequently to happen with the asaphs, we are at a loss to determine.

The animal remains which belong to the genus Triarthrus, differ so much in their form and general characters from all the other trilobites, that we perhaps ought to regard them as forming another race of beings. They are, however, more nearly allied to this family than the Agnosti of Professor Brongniart.

TRIARTHRUS BECKII. *Green.* Cast No. 34. Fig. 6,

Cauda subrotunda, bipunctata; articulis abdominis tribus, absque lobis lateralibus consuetis, sed lobo arcuato utrinque apposito.

The only portions of this fossil which have yet been found, are the abdomen and tail. The abdomen is composed of three joints; the first passes from the side lobes completely over the body, and on its upper surface, near the middle of the back, there is often a minute elevated pimple. The other two, pass obliquely from the lateral lobes, and are interrupted in their course over the body. The tail, or posterior portion, is expanded, something like that of the Isotelus or Dipleura, and has a deep puncture on each side, about half the distance between its terminal border and the last articulation of the abdomen. The lateral lobes are unlike those of any other genus. They form narrow cuniform appendages to the sides; near the first joint of the abdomen they are crossed transversely by an elevated ridge, from which they gradually taper along the sides of the body, and appear to inosculate in a delicate point at the central border of the tail. The abdominal articulations do not pass over these lobes, but just below the last joint, a little transverse furrow, in perfect specimens, may be noticed. The largest specimen of this fragment I have seen is exactly half an inch in length.

This fossil occurs in black shaly limestone, on the

canal near Cahooes Falls, in the State of New York, and at a number of other places in that State.

I have named this species in compliment to my early friend, Professor Theodore Romeyn Beck, M. D. well known both at home and abroad, as the learned author of the work on Medical Jurisprudence. Some time after commencing this little Monograph, I communicated my plan to Dr. Beck, and was surprised and gratified to find that he was also engaged with the same inquiries, and that he was then busy in arranging and examining the unique collection of trilobites belonging to the Albany Institute. Without the smallest hesitation, he placed all his specimens at my disposal, and has facilitated otherwise my undertaking, by every means in his power.

Genus Nuttainia. *Eaton.*

Professor A. Eaton, in his Geological Text Book, has proposed the Genus Nuttainia, to include two remarkable trilobites which could not properly be arranged in any of the previously established genera. The two fossils here grouped together, bear no generic relation to each other. The first species which he calls N. Concentrica, belongs to the genus Cryptolythus, which was proposed before the appearance of his work, and has therefore been noticed in another place.

The genus Nuttainia is thus characterized by its author: "Head in three lobes, the middle one most prominent; the two lateral lobes sub-hemispherical,

or sub-quadrantal; the whole head bordered anteriorly with a punctured fillet; body distinctly three lobed, middle lobe sub-cylindric, and not so broad as the side lobes."

NUTTAINIA SPARSA. *Eaton.* Cast No. 35.

Fillet nearly straight in front of the middle lobe of the head, punctures of the fillet scattered irregularly, without any alternating ridges; head compressed, covered with scattered punctures, having its side lobes much smaller than the middle one; middle lobe with straight sides, giving it somewhat the form of a parallelogram.

Found in third grauwacke,* or grit slate in Coeymans, sixteen miles south-west of Albany. I have the head of one before me two and a half inches broad, and one and a half long. The whole of the animal must have been six or seven inches in length.

The above account is copied from the "Text Book." Mr. Eaton was kind enough to lend me the only specimen of this curious fossil remain, which has yet been found; from which his description was taken, and of which our cast is an exact copy. His generic characters do not in our opinion at all apply to this fragment. Nothing but the head of this

* In a manuscript note, Professor Eaton states that the third grauwacke, or grit slate of Coeymans, "*alternates* with the underlaying cherty lime rock." This opinion some of our geological friends, familiar with the formation at Coeymans, and with the Professor's nomenclature of rocks, have called in question.

singular trilobite remains, and it is doubtful whether what is said to be the punctured fillet, "nearly straight in *front* of the middle lobe," be not the commencement of the articulations of the abdomen. The whole fragment looks very much like the head of some large Asaph or Ogygia.

Genus Brongniatia. *Eaton.*

Professor Eaton has proposed the name Brongniatia (Brongniartia?) for a genus of trilobites, which we think he has not defined with sufficient accuracy to be of any practical use. The *Isotelus gigas* of Dr. Dekay, which has been for a long time so well established, is here ranked merely as a species under the name of B. isotela. The relic which we described before the Geological Text Book appeared as the *Triarthrus Beckii*, forms the species B. carcinodea—and the trilobite which is supposed to be the Asaphus platycephalus of Stokes, is the only other species mentioned. The A. platycephalus,* we know to be identical with the I. gigas, and as the animal remain described by Mr. Eaton is entirely different from Dr. Dekay's fine species, we subjoin the account given in the "Text Book."

Genus Brongniatia—Fore abdomen always, and post abdomen in some cases, longitudinally divided into three lobes, by regular series of undulations tra-

* For a figure and description of the Asaphus Platycephalus, by Mr. Stokes, see Transactions of the Geological Society. Second Series, vol. i.

versing the joints, without grooves; articulations of the side lobes being manifest continuations of those of the middle lobe, and consequently, agreeing in number.

BRONGNIATIA PLATYCEPHALA. *Eaton.*

Head and fore abdomen very broad and depressed, the abdomen with ten joints curved forwards at the undulations; post abdomen and tail with about fifteen joints curved backwards at the undulations; the three lobes of the tail more distinctly separated; divisions between the joints of the abdomen double.

The representation of B. platicephala, figure 20, plate 2, of the Geological Text Book, if it be accurately drawn, is certainly of a trilobite never before described. On the buckler, which is without eyes, there is delineated a figure, not unlike some of the leaves of the mulberry tree.

The tail is also very peculiar. In Silliman's Journal, Volume 21st, page 136, Professor Eaton proposed for this curious fossil the temporary name of Ogygies latissimus. "It is found, he observes, in the upper soft slaty variety of the rock which has been so successfully used for the lias cement at Chittenango, &c. Dr Smith, of Lockport, (N. Y.) sent me two specimens, taken from a continuation of the Chittenango lias rock, immediately beneath the geodiferous lime rock on which the cherty (cornitiferous) reposes." The whole animal is six inches long, and three broad.

Nature of the Trilobite.

Every one familiar with the history of the Trilobites, is aware that a good deal of controversy has existed among naturalists, respecting the precise link in the grand chain of organized beings, these singular fossil animals, should occupy. Professor Brongniart, Dr. Dekay, Audoúin, and several other acute observers, have placed them in the vicinity of the Limuli, and other Entomostraca with numerous feet; while P. A. Latreille and others, presuming that these animals were destitute of locomotive organs, as no vestige of them has ever been discovered, fix their natural position in the neighbourhood of the Chitones; or rather that they constituted the original stock of the Articulata, being connected on the one hand with these latter Mollusca, and on the other with those first mentioned, and even with the Glomeris.* It was our original intention to have closed this Monograph with a short history of these theories —and of the notion advanced by Latreille and others, that the Trilobites have been annihilated by some ancient revolution of our planet. All these matters, we think, are now put to rest by the late discovery of some living Trilobites in the southern seas, near the Falkland Islands. In the cabinet of the Albany Institute, we have examined some of these recent animals, which have very nearly the size and general

* See Cuvier's Animal Kingdom, vol. iii. pp. 135—6.

appearance of the Paradoxides Boltoni, as represented on our frontispiece; the species cannot, however, belong to that genus, as the buckler is furnished with eyes very similar to those of the Calymene Bufo; its organs of locomotion are short, numerous, and concealed under the shell—but I do not feel at liberty to notice the interesting animal more minutely. It will probably be described and figured shortly, in a perfectly full and satisfactory manner, by Dr. James Eights, the enterprising discoverer, together with several other new and remarkable genera and species belonging to the Entomostraca.

FINIS.

Index to the Species.

CALYMENE	Blumenbachii,	page 28
	Callicephala,	30
	Selenecephala,	31
	Platys,	32
	Microps	34
	Anchiops,	35
	Diops,	37
	Macrophthalma	39
	Bufo,	41
	Rana,	42
ASAPHUS,	Laticostatus,	45
	Selenurus,	46
	Limulurus,	48
	Caudatus,	50
	Hausmanni	52
	Pleuroptyx,	55
	Micrurus,	56
	Wetherilli,	57
PARADOXIDES	Boltoni,	60
OGYGIA	Sillimani,	63
ISOTELUS	Gigas,	67
	Planus,	68
	Cyclops,	69
	Megalops,	70
	Stegops,	71
CRYPTOLITHUS	Tessellatus,	73
	Bigsbii,	76
DIPLEURA	Dekayi,	79
TRIMERUS	Delphinocephalus,	82
CERAURUS	Pleurexanthemus,	84
TRIARTHRUS	Beckii,	87
NUTTAINIA	Sparsa,	89
BRONGNIATIA	Platycephala,	91

JOSEPH BRANO,

No. 12, CASTLE STREET, PHILADELPHIA,

Teacher of the Art of Preparing Birds, Quadrupeds, Reptiles, &c. &c.

AND OF THE

Art of making Moulds and Casts in Wax, Plaster, and Compositions.

In addition to the casts taken from the originals of the Trilobites, he has also a few fine casts of the bones of the Megalonix Laqueatus, *Harlan.*—Scaphites Cuvieri, *Morton.*—Mosasaurus tooth, and of several rare fossil American Plants;—all taken from the original fossils, in the Cabinet of the Academy of Natural Sciences, &c. &c. These models are fac similes of the real objects, coloured according to nature.

As the originals of the above are in the possession of different public and private cabinets throughout the United States, I have at great trouble and expense, taken from them exact patterns, so as to accommodate museums and scientific gentlemen with them on very reasonable terms. This practice is now used in several parts of Europe; and thus the curious are able to supply their cabinets with rare specimens, often superior to the originals.

JOSEPH BRANO having finished for us a number of models of different objects in Natural History, we have no hesitation in recommending him as an exceedingly skilful artist.

JACOB GREEN, M. D.
RICH'D. HARLAN, M. D.
P. A. BROWNE, ESQ.
CHAS. A. POULSON.
ISAAC PARRISH, M. D.
S. G. MORTON, M. D.

Philadelphia, October 3d, 1832.

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